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U.S. Patent No. 8,849,807

Active search results page ranking technology

Date: Oct. 7, 2022; updated May 20, 2023

CONFIDENTIAL

U.S. PATENT NO. 8849807

(54) **ACTIVE SEARCH RESULTS PAGE RANKING TECHNOLOGY**

(76) Inventor: **Mark F. McLellan**, Middletown, DE (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 606 days.

(21) Appl. No.: **13/114,774**

(22) Filed: **May 24, 2011**

(65) **Prior Publication Data**

US 2011/0295826 A1 Dec. 1, 2011

Related U.S. Application Data

(60) Provisional application No. 61/347,905, filed on May 25, 2010.

(51) **Int. Cl.**
G06F 17/30 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 17/30867*** (2013.01)
USPC **707/723**

(58) **Field of Classification Search**
None
See application file for complete search history.

Claims: 5 total claims
Priority Date: 2010-05-25
Anticipated Expiration: 2033-01-19

(12) **United States Patent**
McLellan

(10) **Patent No.: US 8,849,807 B2**
(45) **Date of Patent: Sep. 30, 2014**

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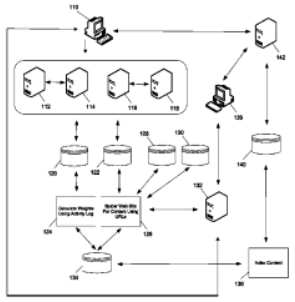
Primary Examiner — Alexey Shmatov
(74) *Attorney, Agent, or Firm* — Gerry J. Elman; Elman Technology Law, P.C.

(57) **ABSTRACT**

Systems and methods for storing data regarding activities of a person and/or people associated with a website that is indexed in a search engine. Data regarding such activities is used to calculate a weighting factor that is combined with a relevance score for the website. The combined weighting factor and relevance score influences the relative position of the website among other websites in search results.

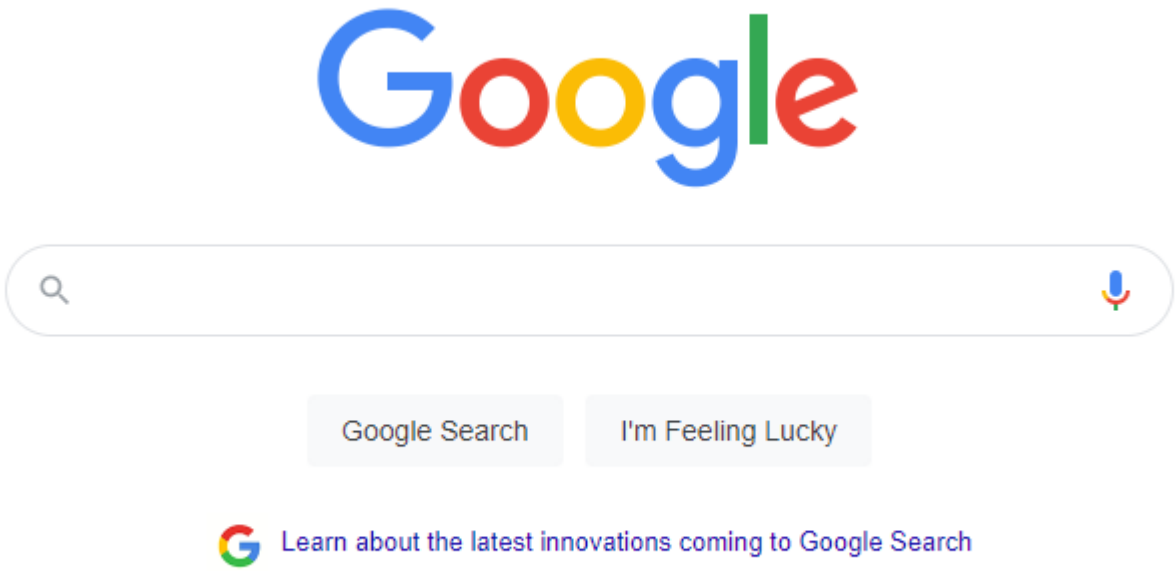
5 Claims, 6 Drawing Sheets



Family Information

Patent / Pub No.	Status	Region
WO2011149934A2	Pub.	WIPO
AU2011258449B2	Granted	Australia
CA2836700C	Granted	Canada

Representative Product



Source:
https://www.google.com/ (10/1/2022)

REPRESENTATIVE CLAIM 1

1. A system for ranking websites comprising:

a first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

a second computer database comprising machine-readable memory having total activity records, each total activity record comprising an activity website ID and a total activity weight;

a third computer database comprising machine-readable memory having activity records, each activity record comprising:

an affiliated website ID,

a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

an activity weight for the website activity;

a tracking system comprising a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;

a search engine computer network having a search engine network connection and one or more search engine processors, the one or more search engine processors having computer-executable instructions for:

receiving a search query through the search engine network connection into the one or more search engine processors, the search query comprising search criteria;

transmitting a request for the website indexing records from the one or more search engine processors to the first computer database;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;

and for each requested activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the requested activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the requested activity record;

calculating a new total activity weight from the sum of the activity weight of the requested activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.

CLAIM 1 (PART 1)

A system for ranking websites comprising:

a first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

a second computer database comprising machine-readable memory having total activity records, each total activity record comprising an activity website ID and a total activity weight;

a third computer database comprising machine-readable memory having activity records, each activity record comprising:

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a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

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a tracking system comprising a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;

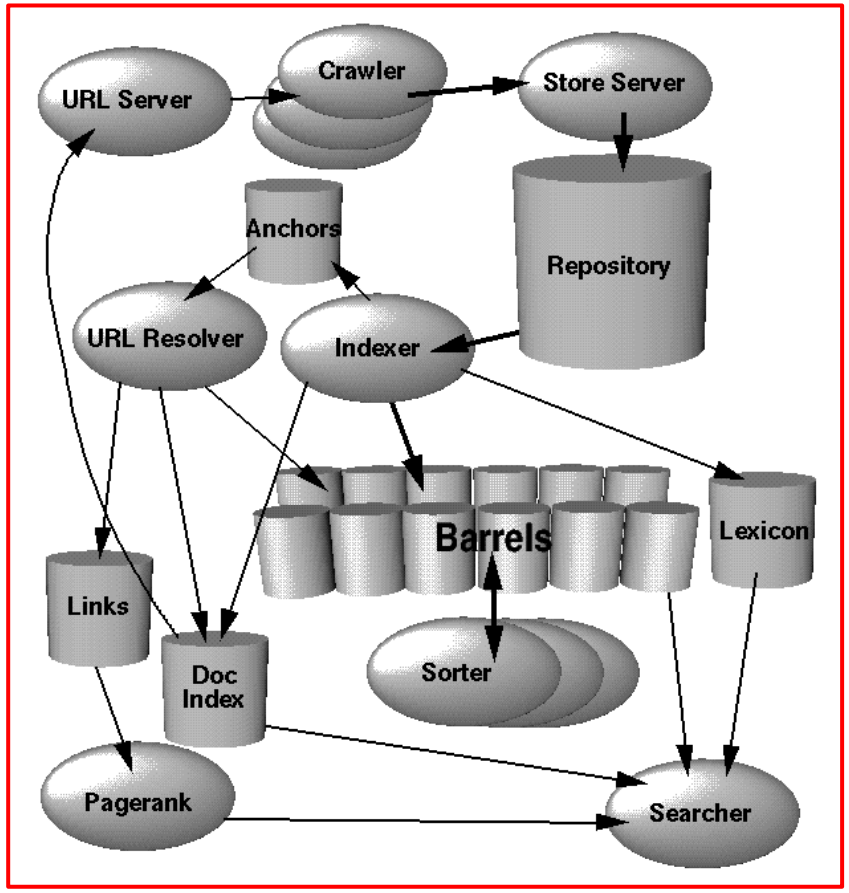

Figure 1. High Level Google Architecture

Source:
http://infolab.stanford.edu/~backrub/google.html (10/1/2022)

CLAIM 1 (PART 1)

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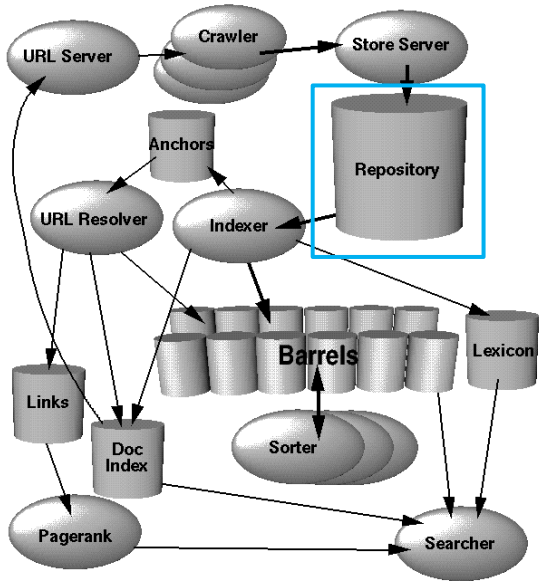

4.2.2 Repository

The repository contains the full HTML of every web page. Each page is compressed using zlib (see RFC1950). The choice of compression technique is a tradeoff between speed and compression ratio. We chose zlib's speed over a significant improvement in compression offered by bzip. The compression rate of bzip was approximately 4 to 1 on the repository as compared to zlib's 3 to 1 compression. In the repository, the documents are stored one after the other and are prefixed by docID, length, and URL as can be seen in Figure 2. The repository requires no other data structures to be used in order to access it. This helps with data consistency and makes development much easier; we can rebuild all the other data structures from only the repository and a file which lists crawler errors.

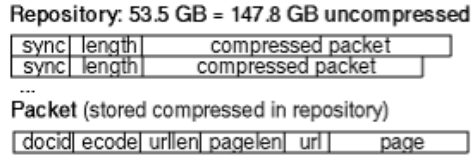

Figure 2. Repository Data Structure

Source:
http://infolab.stanford.edu/~backrub/google.html (10/1/2022)

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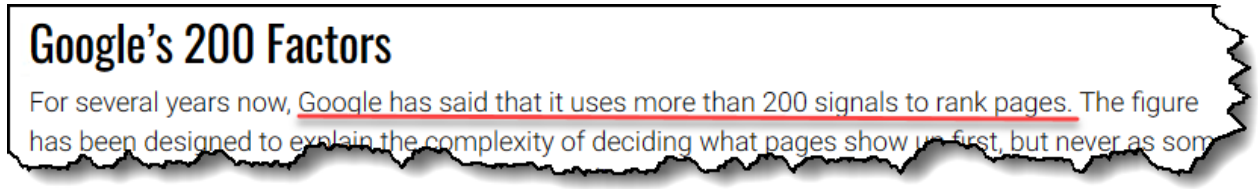
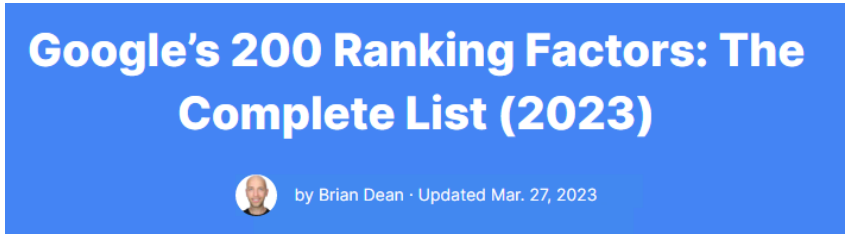


Source:
https://searchengineland.com/bing-10000-ranking-signals-google-55473 (05/14/2023)

Source:
https://seo.co/google-ranking-factors (05/14/2023)



Source:
https://backlinko.com/google-ranking-factors (05/14/2023)

Commentary: As shown by just a few of the references above, it is common knowledge in the Search Engine Optimization (SEO) industry that Google has over 200 ranking factors that Google uses to index and rank website information.

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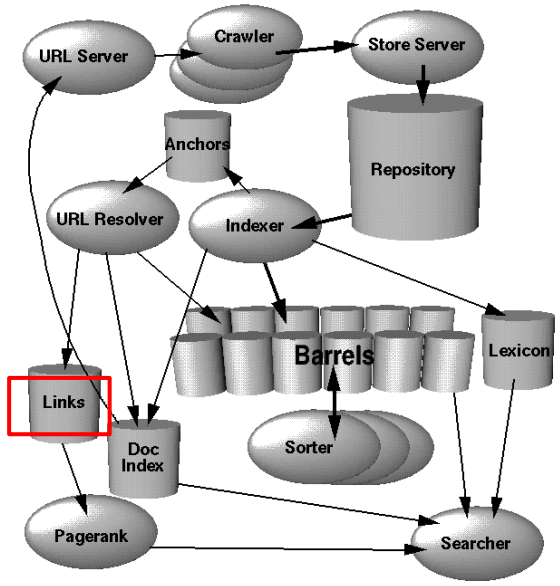

Storage Statistics	
Total Size of Fetched Pages	147.8 GB
Compressed Repository	53.5 GB
Short Inverted Index	4.1 GB
Full Inverted Index	37.2 GB
Lexicon	293 MB
Temporary Anchor Data (not in total)	6.6 GB
Document Index Incl. Variable Width Data	9.7 GB
Links Database	3.9 GB
Total Without Repository	**55.2 GB**
Total With Repository	**108.7 GB**

The URLresolver reads the anchors file and converts relative URLs into absolute URLs and in turn into docIDs. It puts the anchor text into the forward index, associated with the docID that the anchor points to. It also generates a database of links which are pairs of docIDs. The links database is used to compute PageRanks for all the documents.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/1/2022)

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Another intuitive justification is that a page can have a high PageRank if there are many pages that point to it, or if there are some pages that point to it and have a high PageRank. Intuitively, pages that are well cited from many places around the web are worth looking at. Also, pages that have perhaps only one citation from something like the Yahoo! homepage are also generally worth looking at. If a page was not high quality, or was a broken link, it is quite likely that Yahoo's homepage would not link to it. PageRank handles both these cases and everything in between by recursively propagating weights through the link structure of the web.

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large font, plain text small font, ...), each of which has its own type-weight. The type-

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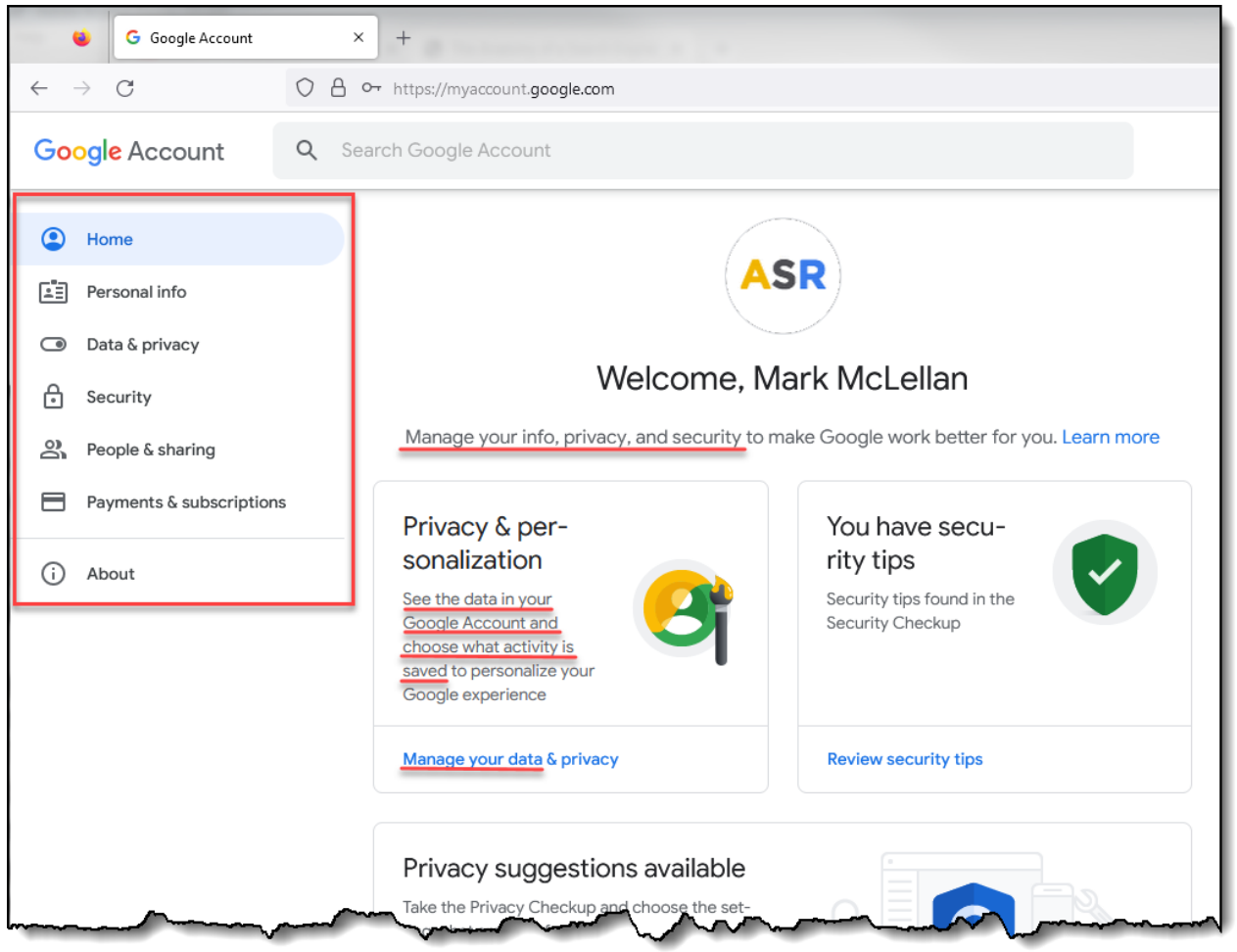

Commentary: Google stores Personal Information, Data & Privacy, Security, People & Sharing and Payments & Subscriptions information as shown on the Google Account page (a third computer database.)

Source
https://myaccount.google.com/ (03/11/2023)

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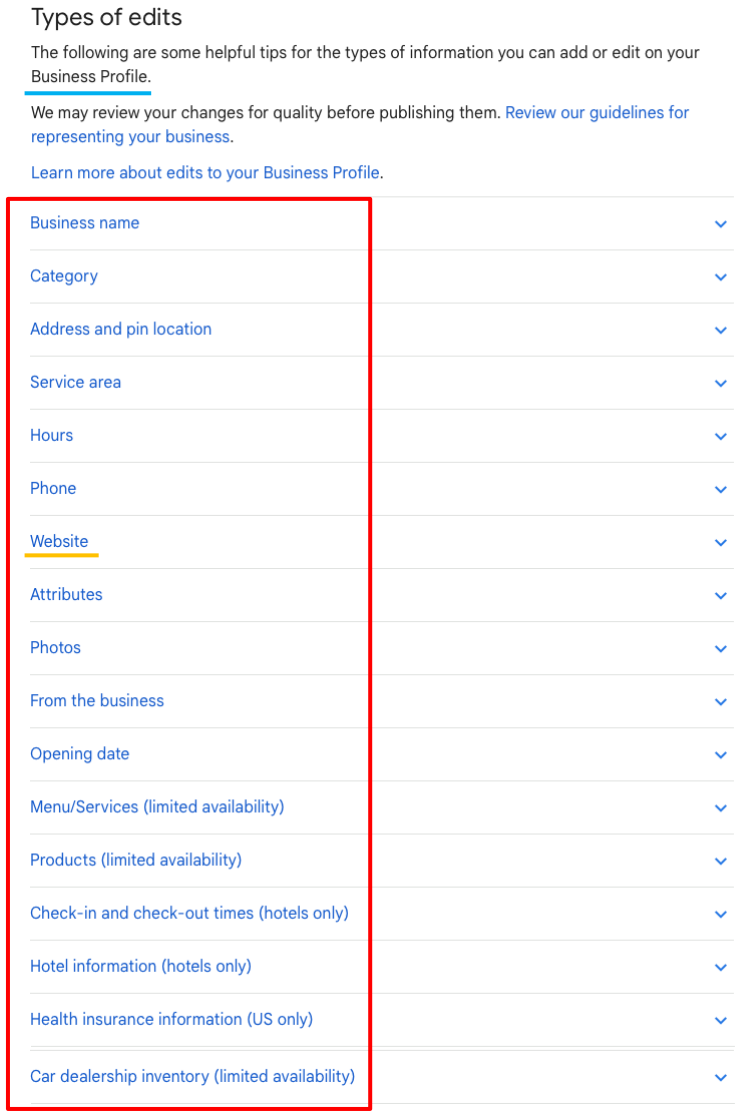

Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: Google search ties together what it can about a given website when it combines additional information given to it by business owners (authoritative sources).

For example, a given "Business Profile" (a third computer database) with a website which Google has crawled, combined with a Google Ads account, and Google registered users (e.g. promoter ID), and other website activity such as providing hours of operation, photos, phone #, responding to reviews, etc. influence how Google ultimately ranks such a business in the search results.

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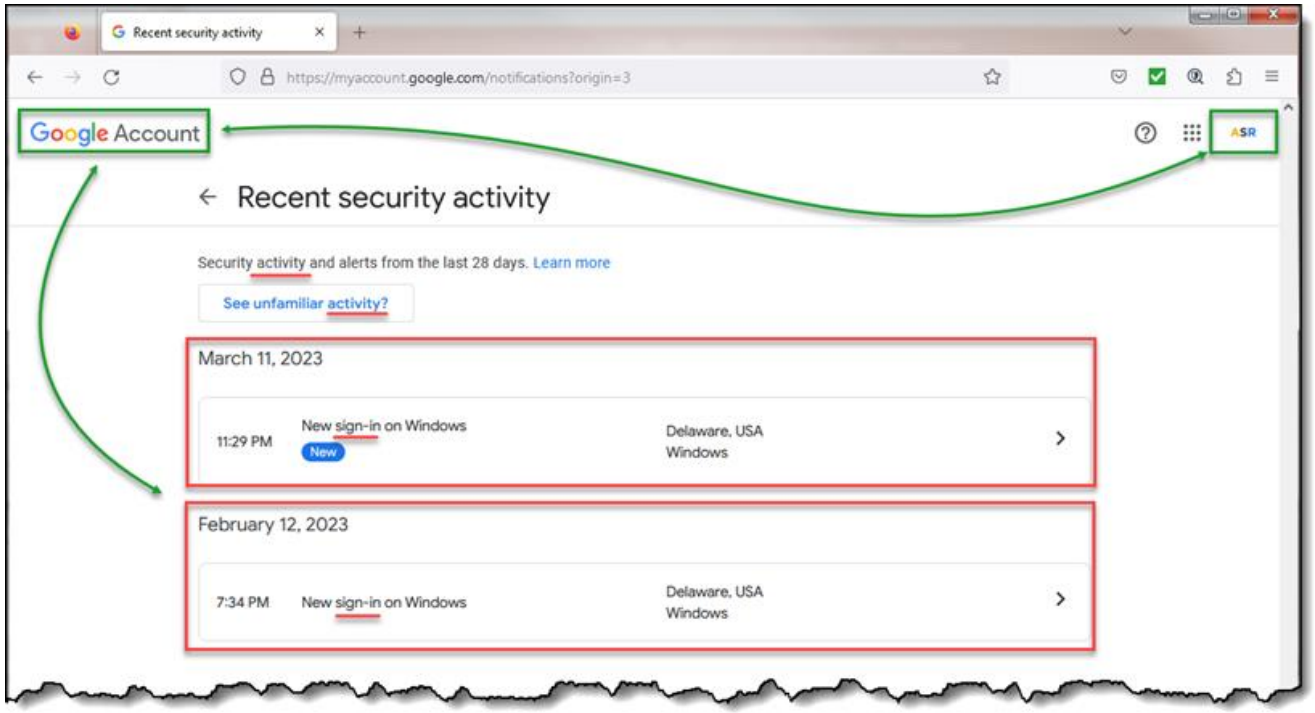

Commentary: Google maintains sign-in activity records that are connected to the affiliated website as presented on the Google Account page.

Source
https://myaccount.google.com/notifications?origin=3 (03/11/2023)

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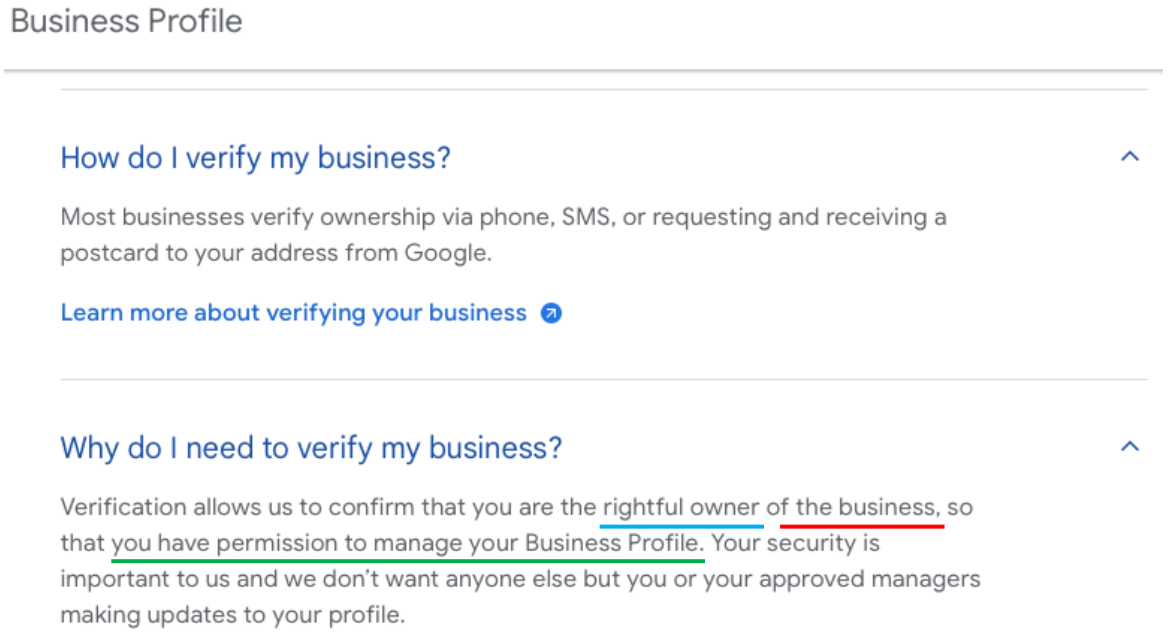

Commentary: The promoter ID is merely the user who Google recognizes as the maintainer of the business profile information. Google may well associate other information with that user should they be affiliated with multiple business profiles.

Source:
https://www.google.com/business/faq/ (10/2/2022)

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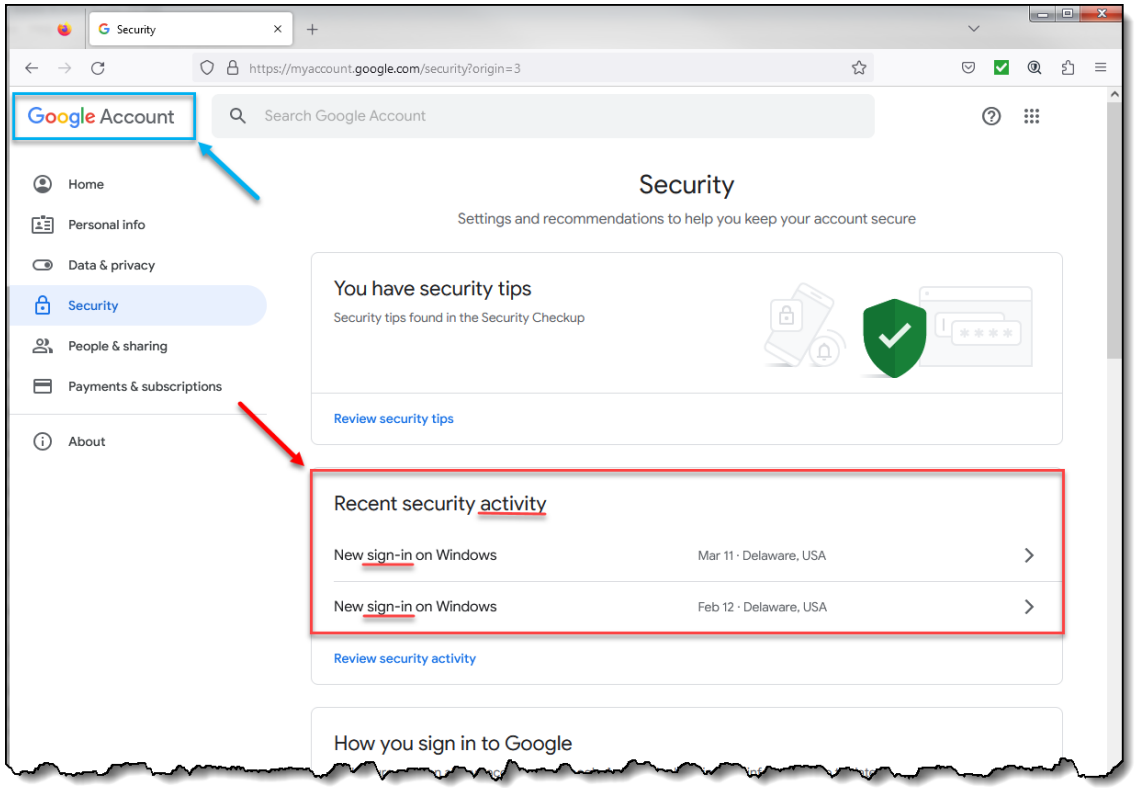

Commentary: The website activity ID is the identifier that is assigned to a website owner signing into their Google account. Sign-in activity is recorded in the Recent Security Activity section of the promoters' Google Account profile.

It is common industry practice to assign unique IDs to data records in information systems. Even if there is no unique ID assigned to the activity itself, the name of the activity is also identified by its activity name and can be considered the Activity ID.

Source:
https://myaccount.google.com/security?origin=3 (3/11/1023)

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How Google determines local ranking

Local results are based primarily on relevance, distance, and prominence. A combination of these factors helps us find the best match for your search. For example, our algorithms might decide that a business that's farther away from your location is more likely to have what you're looking for than a business that's closer, and therefore rank it higher in local results.

Relevance

Relevance refers to how well a local Business Profile matches what someone is searching for. Add complete and detailed business information to help Google better understand your business and match your profile to relevant searches.

Distance

Prominence

Prominence refers to how well known a business is. Some places are more prominent in the offline world, and search results try to reflect this in local ranking. For example, famous museums, landmark hotels, or well-known store brands are also likely to be prominent in local search results.

Prominence is also based on information that Google has about a business, from across the web, like links, articles, and directories. Google review count and review score factor into local search ranking. More reviews and positive ratings can improve your business' local ranking. Your position in web results is also a factor, so search engine optimization (SEO) best practices apply.

Tip: There's no way to request or pay for a better local ranking on Google. We do our best to keep the search algorithm details confidential, to make the ranking system as fair as possible for everyone.

Source:
https://support.google.com/business/answer/7091?hl=en#zippy=%2Cprominence (10/2/1022)

Commentary: Google Business Profile represents datastore (e.g. database) containing individual records for each business which are likely associated with their own unique ID which Google then can associate various information (each of which when updated or interacted with could represent “activity”) about each business (from an authoritative source - the business owner). Google can then connect the dots with other information it already has to deliver a fairly comprehensive and legit search record about that business.

CLAIM 1 (PART 1)

A system for ranking websites comprising:

a first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

a second computer database comprising machine-readable memory having total activity records, each total activity record comprising an activity website ID and a total activity weight;

a third computer database comprising machine-readable memory having activity records, each activity record comprising:

an affiliated website ID,

a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

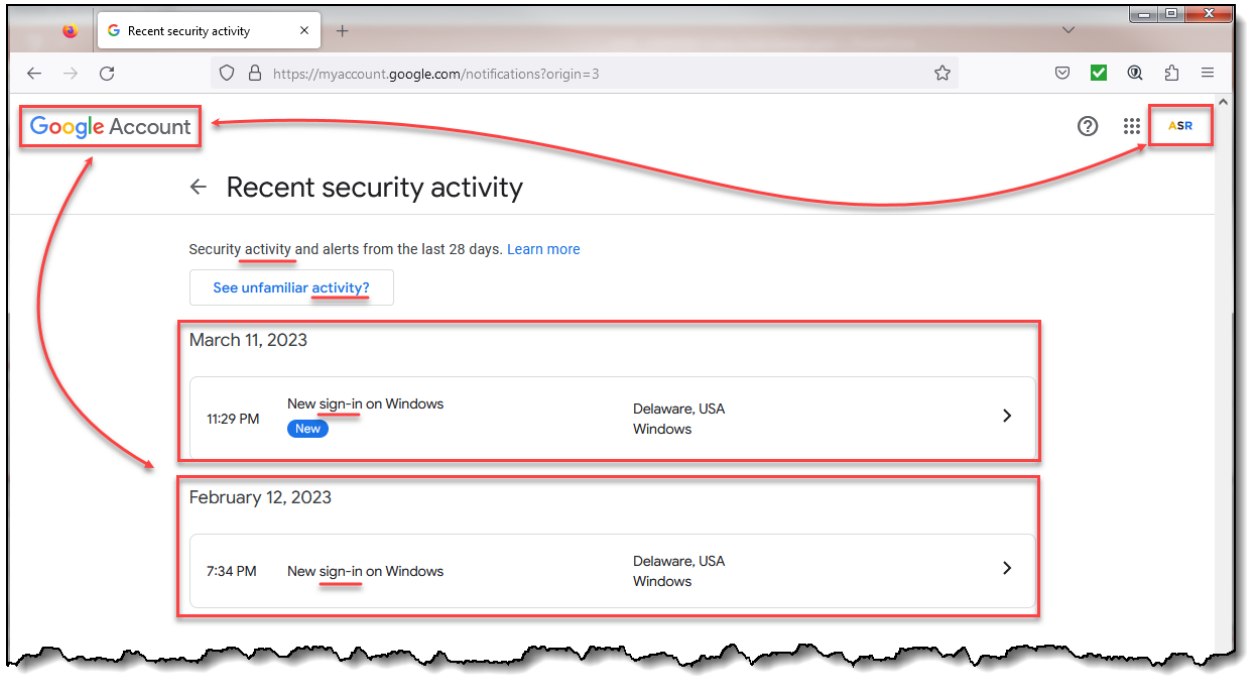
an activity weight for the website activity;

a tracking system comprising a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;



Commentary: The website activity of sign-in is being performed by the website promoter shown in the Google Account Recent security activity page.

Source
https://myaccount.google.com/notifications?origin=3 (03/11/2023)

CLAIM 1 (PART 1)

A system for ranking websites comprising:

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a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

an activity weight for the website activity;

a tracking system comprising a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

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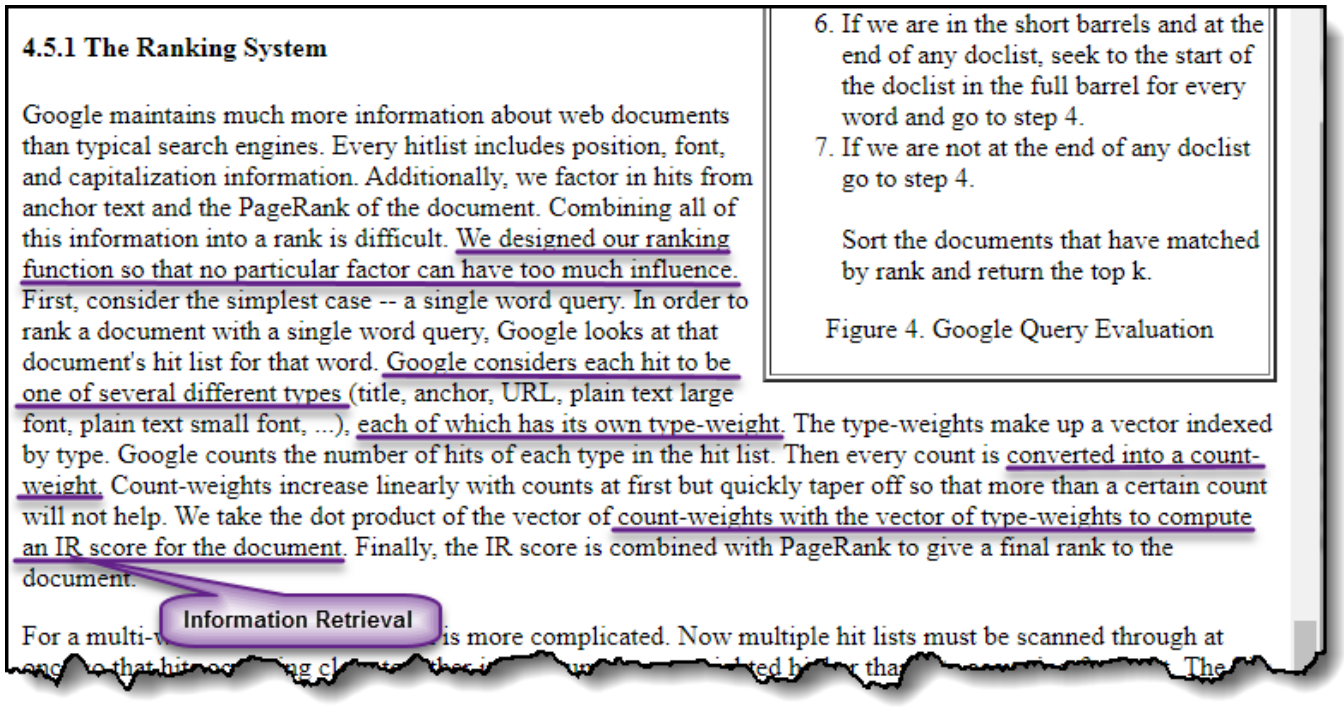


4.5.1 The Ranking System

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large font, plain text small font, ...), each of which has its own type-weight. The type-weights make up a vector indexed by type. Google counts the number of hits of each type in the hit list. Then every count is converted into a count-weight. Count-weights increase linearly with counts at first but quickly taper off so that more than a certain count will not help. We take the dot product of the vector of count-weights with the vector of type-weights to compute an IR score for the document. Finally, the IR score is combined with PageRank to give a final rank to the document.

Information Retrieval

For a multi- is more complicated. Now multiple hit lists must be scanned through at

6. If we are in the short barrels and at the end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.
7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

Commentary: Google's ranking system uses weighting extensively on each and every aspect being considered - for example, just reviewing the hit types, Google associates a weight to each and every hit type. Google's blog post on the next page clearly shows that "activity" weighting is being applied to the "Login" activity.

Source
http://infolab.stanford.edu/~backrub/google.html (03/11/2023)

CLAIM 1 (PART 1)

A system for ranking websites comprising:

a first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

a second computer database comprising machine-readable memory having total activity records, each total activity record comprising an activity website ID and a total activity weight;

a third computer database comprising machine-readable memory having activity records, each activity record comprising:

an affiliated website ID,

a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

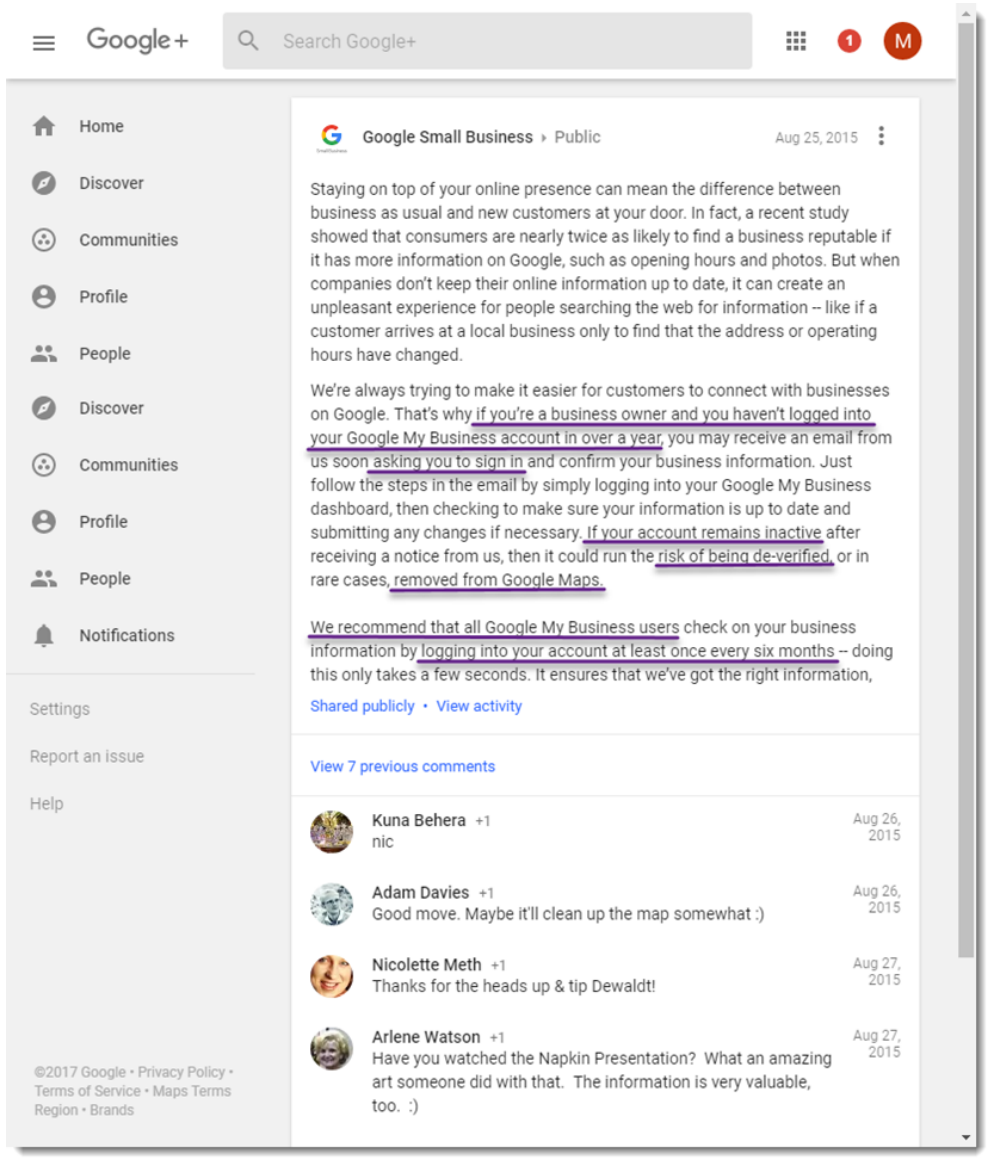
an activity weight for the website activity;

a tracking system comprising a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;



Source
https://plus.google.com/115200251016762857369 (09/18/2017)

Commentary: As Google's blog post clearly states, the login activity determines if the website runs the "risk of being de-verified." De-verification would require some type of weight in order to determine its position in the rankings.

As Google stated in the previous page, "We design our ranking function so that no particular factor can have too much influence."

These stated facts would highly suggest that the login activity factor influences rankings without completely removing the website from the search results.

CLAIM 1 (PART 1)

A system for ranking websites comprising:

a first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

a second computer database comprising machine-readable memory having total activity records, each total activity record comprising an activity website ID and a total activity weight;

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an affiliated website ID,

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a tracking system comprising a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

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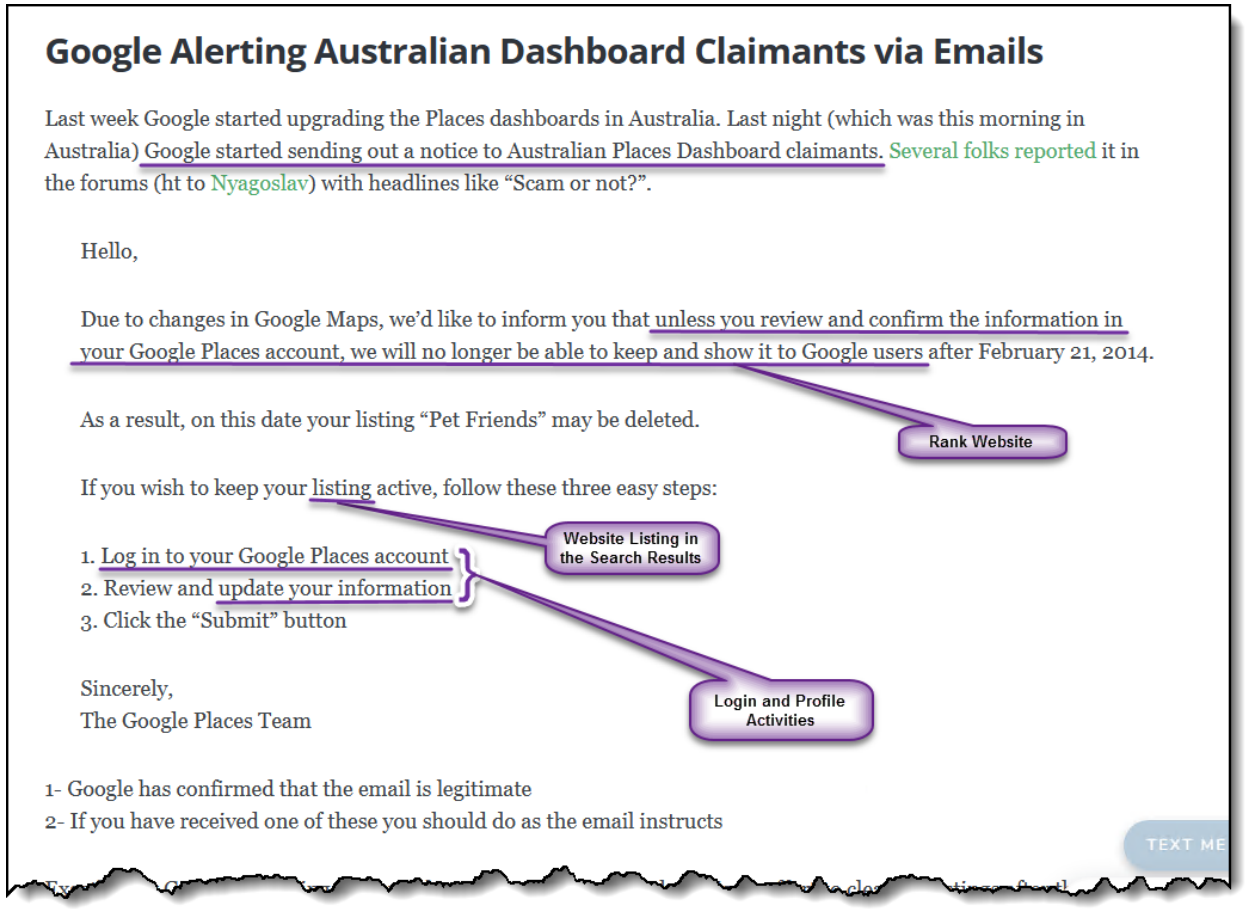

Commentary: Google sent out emails to their Australian users of Google Places. The email clearly states that the login and profile update activities both determine if the website listing ranks.

The email from Google shows that the promoter's activity directly influences Google's ranking results of the promoter's website listing.

Source
https://blumenthals.com/blog/2014/02/03/google-alerting-australian-dashboard-claimants-via-emails/ (05/19/2023)

CLAIM 1 (PART 1)

A system for ranking websites comprising:

a first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

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an affiliated website ID,

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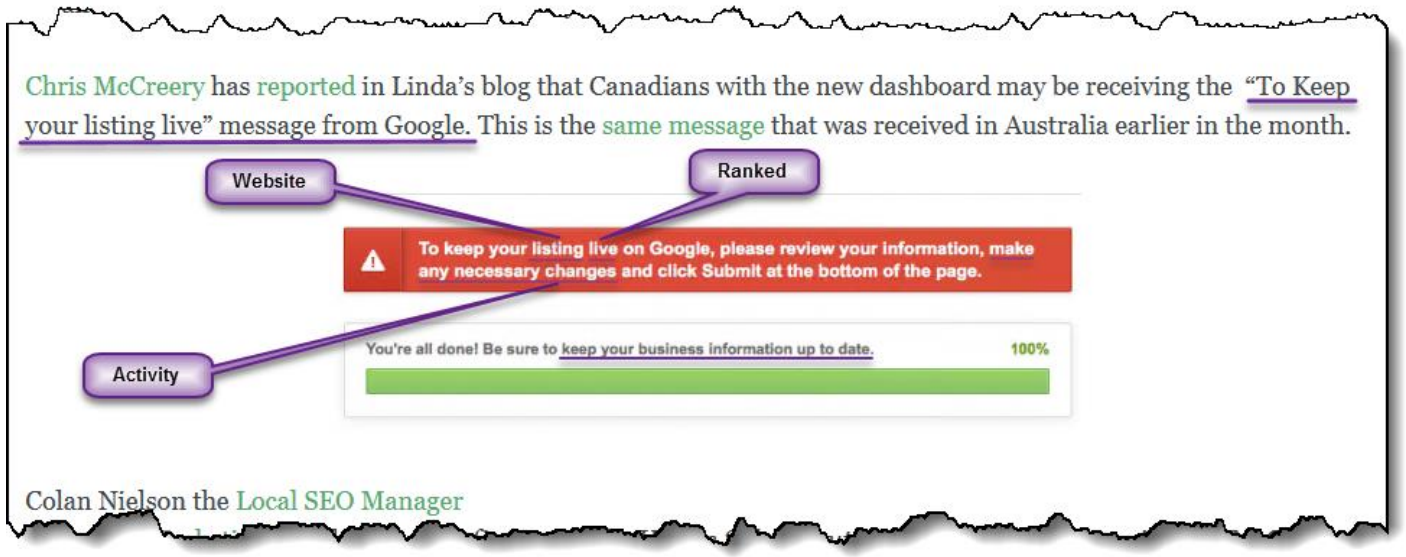

Commentary: Google sent out the same "To Keep your listing live" message to Canadian users that Google sent to their Australian users of Google Places as an email.

The message clearly states that if the promoter wants their website ranked, they must engage in promoter activity.

Source
https://blumenthals.com/blog/2014/02/21/canadian-dashboards-now-receiving-warning-it-is-not-the-canadian-placopalypse/ (05/19/2023)

CLAIM 1 (PART 1)

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How Google determines local ranking

Local results are based primarily on relevance, distance, and prominence. A combination of these factors helps us find the best match for your search. For example, our algorithms might decide that a business that's farther away from your location is more likely to have what you're looking for than a business that's closer, and therefore rank it higher in local results.

Relevance

Relevance refers to how well a local Business Profile matches what someone is searching for. Add complete and detailed business information to help Google better understand your business and match your profile to relevant searches.

Distance

Prominence

Prominence refers to how well known a business is. Some places are more prominent in the offline world, and search results try to reflect this in local ranking. For example, famous museums, landmark hotels, or well-known store brands are also likely to be prominent in local search results.

Prominence is also based on information that Google has about a business, from across the web, like links, articles, and directories. Google review count and review score factor into local search ranking. More reviews and positive ratings can improve your business' local ranking. Your position in web results is also a factor, so search engine optimization (SEO) best practices apply.

Tip: There's no way to request or pay for a better local ranking on Google. We do our best to keep the search algorithm details confidential, to make the ranking system as fair as possible for everyone.

Source:
https://support.google.com/business/answer/7091?hl=en#zippy=%2Cprominence (10/2/1022)

Commentary: The next three pages show that Google factors into its algorithm "business profile activity" - particularly completeness of business information provided by the business owner as well as the owners interaction with their business profile (e.g., managing profile). Due to the need for speeding search results mentioned earlier, such information must be "summed up" pretty regularly to some quantifiable figure (e.g., activity weight) that can be easily combined with other search criteria (e.g., relevance, distance, and prominence) to allow Google to adequately rank the search results speedily.

CLAIM 1 (PART 1)

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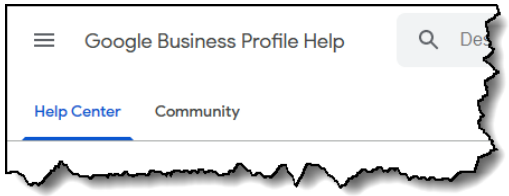

Commentary: Google clearly states on their "Google Business Profile Help" page that "To make sure your business is eligible to show up on Google, verify your Business Profile."

Verifying your Business Profile requires an account to be created and is considered a promoter activity. After creating the account, the promoter's website is eligible for ranking in the search results which would require some type of weighting signal.

Source:
https://support.google.com/business/answer/2911778?hl=en (5/19/1023)

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Commentary: According to Kevin Rowe at the Search Engine Journal, creating (claiming) a Google Business Profile, promoter activity, is the number one ranking signal that will help improve local SEO, Search Engine Optimization, i.e., Search Engine Rankings.

Source:
https://www.searchenginejournal.com/local-seo/local-search-ranking-signals/ (5/19/1023)

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tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;

Commentary: According to Safari Digital's "9 Local SEO Ranking Factors 2023" the most crucial local Search Engine Optimization ranking factor is with the promoter performing the creating an account activity (setting up) for a Google Business Profile (formally GMB). In addition, listing, verifying and managing are other activities listed as crucial promoter activities for a positive influence on rankings.

Source:
https://www.safaridigital.com.au/blog/local-seo-ranking-factors/ (5/19/1023)

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4.5.1 The Ranking System

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large font, plain text small font, ...), each of which has its own type-weight. The type-weights make up a vector indexed by type. Google counts the number of hits of each type in the hit list. Then every count is converted into a count-weight. Count-weights increase linearly with counts at first but quickly taper off so that more than a certain count will not help. We take the dot product of the vector of count-weights with the vector of type-weights to compute an IR score for the document. Finally, the IR score is combined with PageRank to give a final rank to the document.

any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.

7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

Commentary: Google's ranking system uses weighting extensively on each and every aspect being considered - for example just reviewing the hit types, Google associates a weight to each and every hit type. Thus it is likely that factoring in "activity" weighting is also used.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

CLAIM 1 (PART 1)

A system for ranking websites comprising:

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a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

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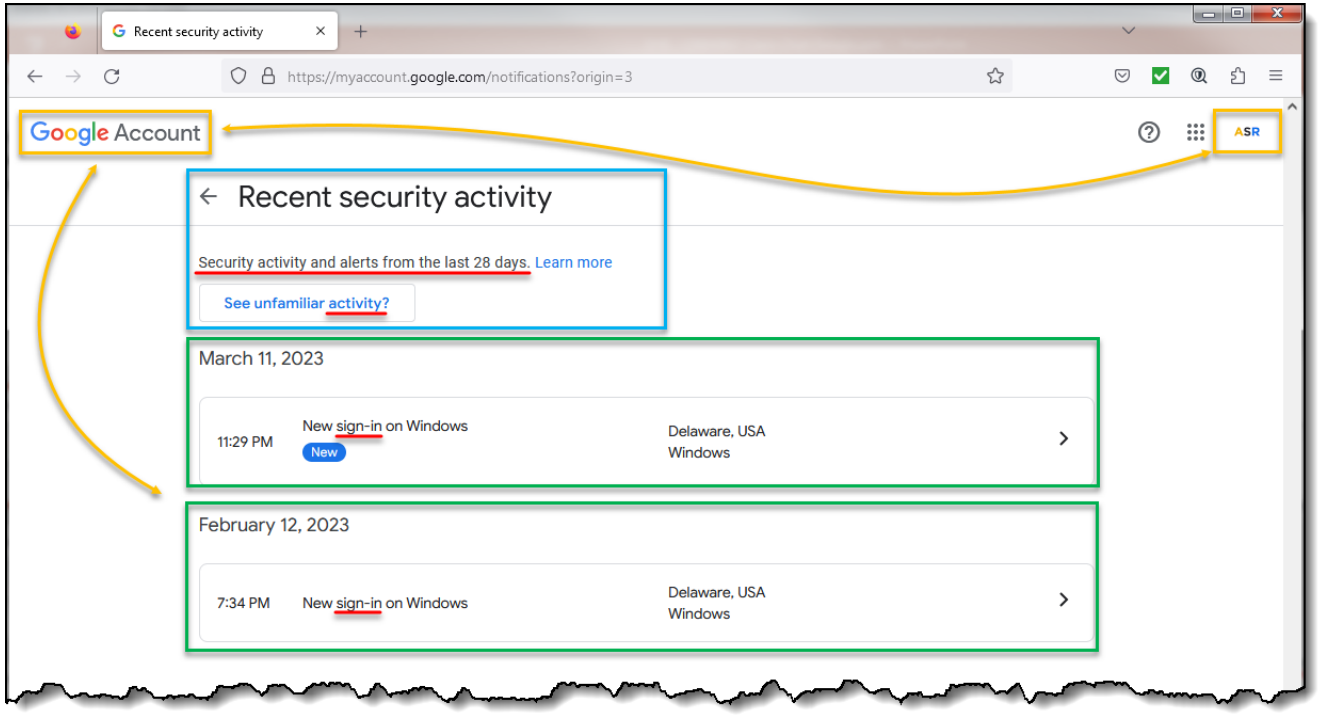

Commentary: A tracking system is presented on the "Recent security activity" page within the business owners profile account. Sign-in activity records are clearly tracked, assembled and transmitted to the promoter and presented on this page.

Source
https://myaccount.google.com/notifications?origin=3 (03/11/2023)

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A system for ranking websites comprising:

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a second computer database comprising machine-readable memory having total activity records, each total activity record comprising an activity website ID and a total activity weight;

a third computer database comprising machine-readable memory having activity records, each activity record comprising:

an affiliated website ID,

a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

an activity weight for the website activity;

a tracking system comprising a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;

How Google sources business information

Information in profiles is compiled from a variety of sources:

- **Publicly-available information**, such as crawled web content (e.g., information from a business' official website)
- **Licensed data from third parties**
- **Users** who contribute factual information (such as addresses and phone numbers), and content (such as photos and reviews), including business owners who claim profiles through Google Business Profile
- **Information based on Google's interactions with a local place or business**

If you believe a profile is inaccurate or should be removed, you can suggest an edit or flag it for removal. If you believe a profile should be removed under European data protection laws, please see here. If you believe it should be removed for any other legal reason, please submit a legal request. For further information about how Google processes personal data in the context of profiles, please see Google's Privacy Policy.

Information in local search results

Google uses business information to help surface relevant local search results across Google, such as in Google Maps and Search.

For example, if you own a hair salon, your business might appear in local search results for people who search for "salons near me" or "salons open now" because you've provided information that includes your address and hours. Learn more about local search results.

Source:
https://support.google.com/business/answer/2721884 (10/2/2022)

Commentary: It seems likely, Google would use its existing crawler or login interface to monitor (e.g. track) changes to business profile information, reviews, and other sources of business information, compile these changes (if any) using its latest algorithm, and then save the compiled (e.g. weighted) result in the appropriate place(s) to speed follow on searches.

CLAIM 1 (PART 2)

a search engine computer network having a search engine network connection and one or more search engine processors, the one or more search engine processors having computer-executable instructions for:

receiving a search query through the search engine network connection into the one or more search engine processors, the search query comprising search criteria;

transmitting a request for the website indexing records from the one or more search engine processors to the first computer database;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

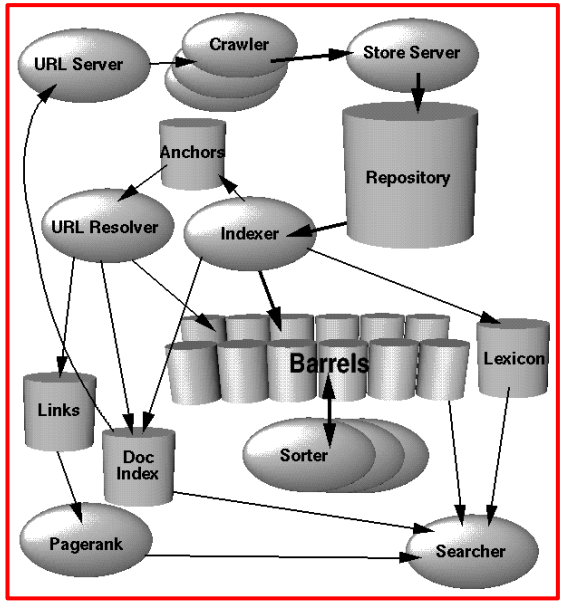
matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

Commentary: Search engine processors make up the entire Google high level architecture for searching the Internet - no one component (processor) in the architecture is less important than the other.

CLAIM 1 (PART 2)

a search engine computer network having a search engine network connection and one or more search engine processors, the one or more search engine processors having computer-executable instructions for:

receiving a search query through the search engine network connection into the one or more search engine processors, the search query comprising search criteria;

transmitting a request for the website indexing records from the one or more search engine processors to the first computer database;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;

9. 1 Scalability of Google

We have designed Google to be scalable in the near term to a goal of 100 million web pages. We have just received disk and machines to handle roughly that amount. All of the time consuming parts of the system are parallelize and roughly linear time. These include things like the crawlers, indexers, and sorters. We also think that most of the data structures will deal gracefully with the expansion. However, at 100 million web pages we will be very close up against all sorts of operating system limits in the common operating systems (currently we run on both Solaris and Linux). These include things like addressable memory, number of open file descriptors, network sockets and bandwidth, and many others. We believe expanding to a lot more than 100 million pages would greatly increase the complexity of our system.

Commentary: Network sockets and bandwidth are very common terms used in the computer industry to support network connectivity.

Source
http://infolab.stanford.edu/~backrub/google.html (03/11/2023)

CLAIM 1 (PART 2)

a search engine computer network having a search engine network connection and one or more search engine processors, the one or more search engine processors having computer-executable instructions for:

receiving a search query through the search engine network connection into the one or more search engine processors, the search query comprising search criteria;

transmitting a request for the website indexing records from the one or more search engine processors to the first computer database;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;

4.1 Google Architecture Overview

In this section, we will give a high level overview of how the whole system works as pictured in Figure 1. Further sections will discuss the applications and data structures not mentioned in this section. Most of Google is implemented in C or C++ for efficiency and can run in either Solaris or Linux.

In Google, the web crawling (downloading of web pages) is done by several distributed crawlers. There is a URLserver that sends lists of URLs to be fetched to the crawlers. The web pages that are fetched are then sent to the storeserver. The storeserver then compresses and stores the web pages into a repository. Every web page has an associated ID number called a docID which is assigned whenever a new URL is parsed out of a web page. The indexing function is performed by the indexer and the sorter. The indexer performs a number of functions. It reads the repository, uncompresses the documents, and parses them. Each document is converted into a set of word occurrences called hits. The hits

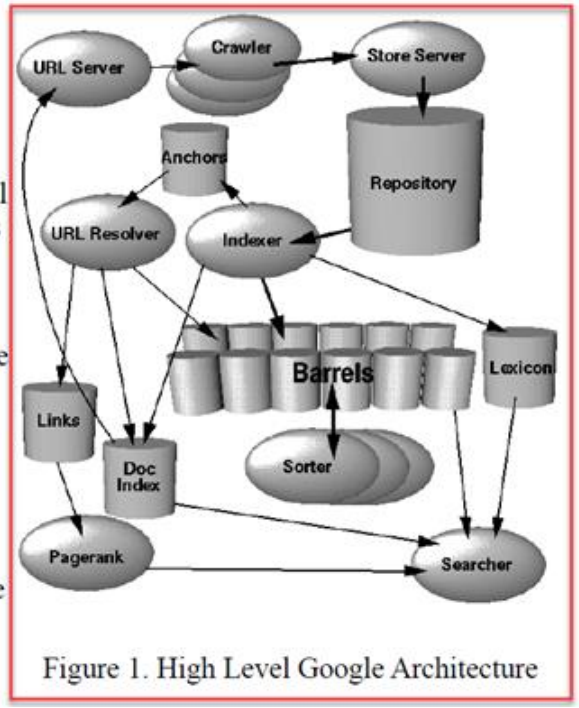


Figure 1. High Level Google Architecture

Commentary: Solaris and Linux computers both contain computer processors and in the context of this Google Architecture Overview, these computers are being defined in a search engine context and can therefore be defined as search engine processors.

The high-level overview described by this Google Architecture Overview describes the whole system as pictured in Figure 1 and further defines that the whole system is made up of Solaris and/or Linux systems mostly running C and C++. From this description we can conclude that the entire diagram is a system with one or more search engine processors having executable instructions.

Source
http://infolab.stanford.edu/~backrub/google.html (03/11/2023)

CLAIM 1 (PART 2)

a search engine computer network having a search engine network connection and one or more search engine processors, the one or more search engine processors having computer-executable instructions for:

receiving a search query through the search engine network connection into the one or more search engine processors, the search query comprising search criteria;

transmitting a request for the website indexing records from the one or more search engine processors to the first computer database;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

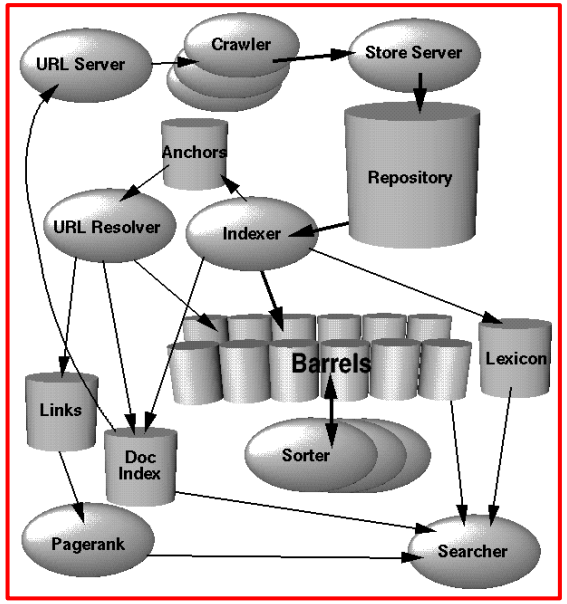
matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

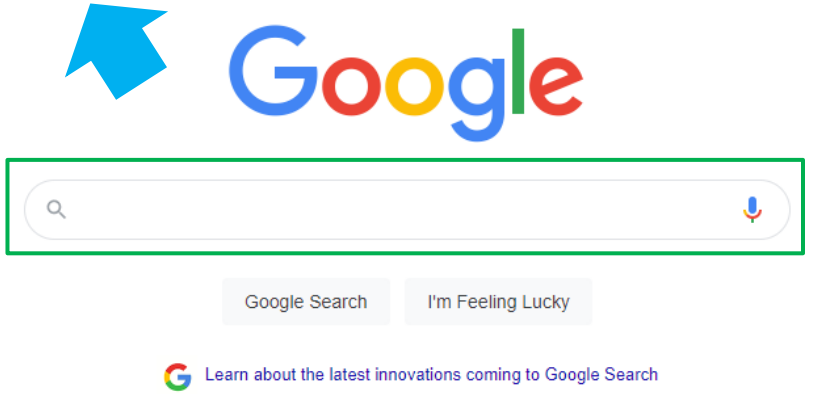
assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Commentary: For Google to respond to search request from users, the search engine performs many ongoing background tasks including: crawling, indexing, resolving, linking, ranking, sorting, etc.



Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)
https://www.google.com (10/2/2022)

CLAIM 1 (PART 2)

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receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

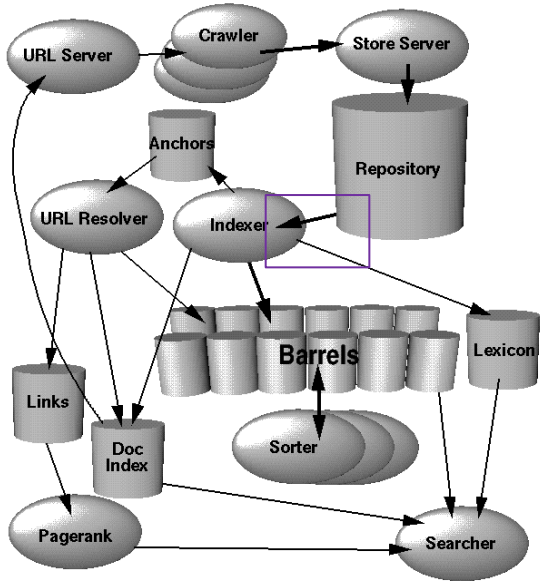
matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Commentary: Although the arrow in the figure shows data from the Repository flowing to the Indexer, the white paper clearly states that the Indexer reads from the Repository and that the indexing function is performed by the Indexer.

In Google, the web crawling (downloading of web pages) is done by several distributed crawlers. There is a URLserver that sends lists of URLs to be fetched to the crawlers. The web pages that are fetched are then sent to the storeserver. The storeserver then compresses and stores the web pages into a repository. Every web page has an associated ID number called a docID which is assigned whenever a new URL is parsed out of a web page. The indexing function is performed by the indexer and the sorter. The indexer performs a number of functions. It reads the repository, uncompresses the documents, and parses them. Each document is converted into a set of word occurrences called hits. The hits record the word, position in document, an approximation of font size, and capitalization. The indexer distributes these hits into a set of "barrels", creating a partially sorted forward index. The indexer performs another important function. It parses out all the links in every web page and stores important information about them in an anchors file. This file contains enough information to determine where each link points from and to, and the text of the link.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

CLAIM 1 (PART 2)

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receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

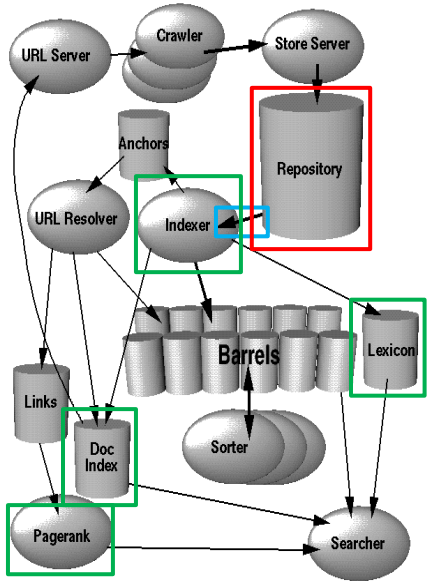
matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

Commentary: The search engine processors make up the elements used by the search engine to create a list of relevant websites that closely match the original search query.

CLAIM 1 (PART 2)

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matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

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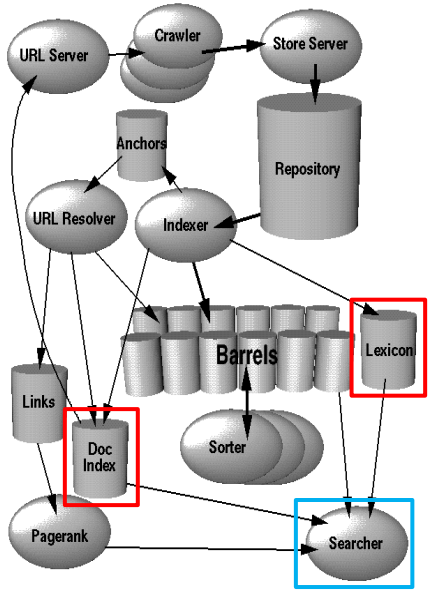
assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Commentary: The Searcher (Google's actual search function) uses one or more of the search engine processors (e.g. Lexicon) to "answer queries" (calculate relevance scores for each indexed website) as it compares against the original search criteria to complete the search.

The sorter takes the barrels, which are sorted by docID (this is a simplification, see Section 4.2.5), and resorts them by wordID to generate the inverted index. This is done in place so that little temporary space is needed for this operation. The sorter also produces a list of wordIDs and offsets into the inverted index. A program called DumpLexicon takes this list together with the lexicon produced by the indexer and generates a new lexicon to be used by the searcher. The searcher is run by a web server and uses the lexicon built by DumpLexicon together with the inverted index and the PageRanks to answer queries.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

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receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

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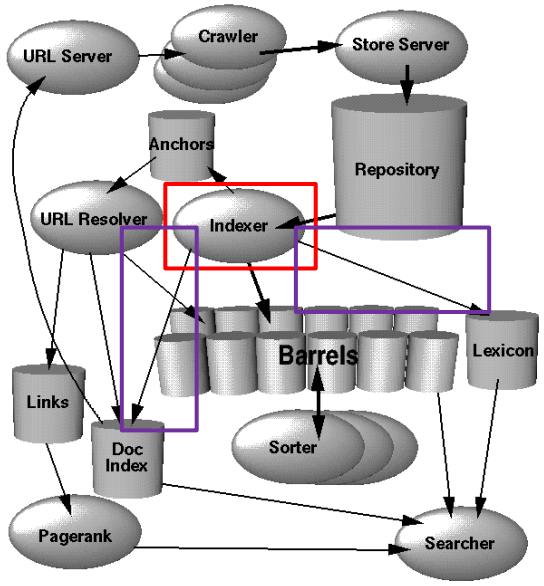

4.2.3 Document Index

The document index keeps information about each document. It is a fixed width ISAM (Index sequential access mode) index, ordered by docID. The information stored in each entry includes the current document status, a pointer into the repository, a document checksum, and various statistics. If the document has been crawled, it also contains a pointer into a variable width file called docinfo which contains its URL and title. Otherwise the pointer points into the URLlist which contains just the URL. This design decision was driven by the desire to have a reasonably compact data structure, and the ability to fetch a record in one disk seek during a search

Additionally, there is a file which is used to convert URLs into docIDs. It is a list of URL checksums with their corresponding docIDs and is sorted by checksum. In order to find the docID of a particular URL, the URL's checksum is computed and a binary search is performed on the checksums file to find its docID. URLs may be converted into docIDs in batch by doing a merge with this file. This is the technique the URLresolver uses to turn URLs into docIDs. This batch mode of update is crucial because otherwise we must perform one seek for every link which assuming one disk would take more than a month for our 322 million link dataset.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

Commentary: Google's use of activity in ranking search results came well after this initial architecture (which was primarily focused on relevance), but keeping with this design, it makes sense that the Indexer would have both the total activity weight as well as a pointer (ID) to the activity record (stored in an additional database - e.g. like Repository) containing said activity to keep with its earlier design decisions around compact data structure and a single fetch of all information needed to sufficiently rank search results. It is likely that use of the words "various statistics" in this initial white paper paved the way for enhanced ranking criteria to be factored into new versions of Google search in years to come.

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receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

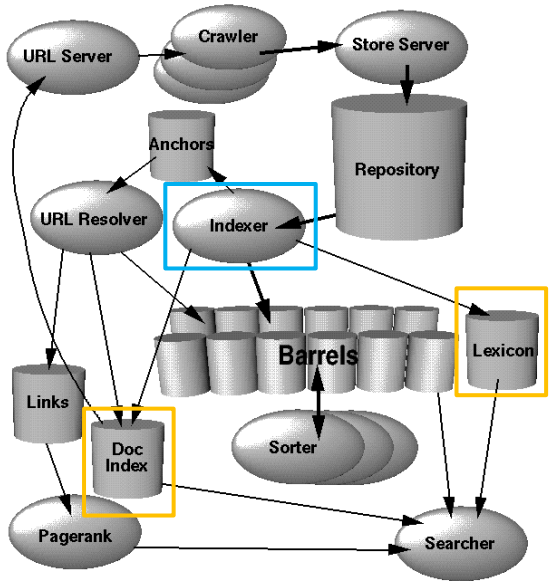
matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Commentary: The activity records (believed to be stored in the Indexer) are sent to the one or more search engine processors so that this information can be figured into generating the search results.

4.2.3 Document Index

The document index keeps information about each document. It is a fixed width ISAM (Index sequential access mode) index, ordered by docID. The information stored in each entry includes the current document status, a pointer into the repository, a document checksum, and various statistics. If the document has been crawled, it also contains a pointer into a variable width file called docinfo which contains its URL and title. Otherwise the pointer points into the URLlist which contains just the URL. This design decision was driven by the desire to have a reasonably compact data structure, and the ability to fetch a record in one disk seek during a search

Additionally, there is a file which is used to convert URLs into docIDs. It is a list of URL checksums with their corresponding docIDs and is sorted by checksum. In order to find the docID of a particular URL, the URL's checksum is computed and a binary search is performed on the checksums file to find its docID. URLs may be converted into docIDs in batch by doing a merge with this file. This is the technique the URLresolver uses to turn URLs into docIDs. This batch mode of update is crucial because otherwise we must perform one seek for every link which assuming one disk would take more than a month for our 322 million link dataset.

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http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

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transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

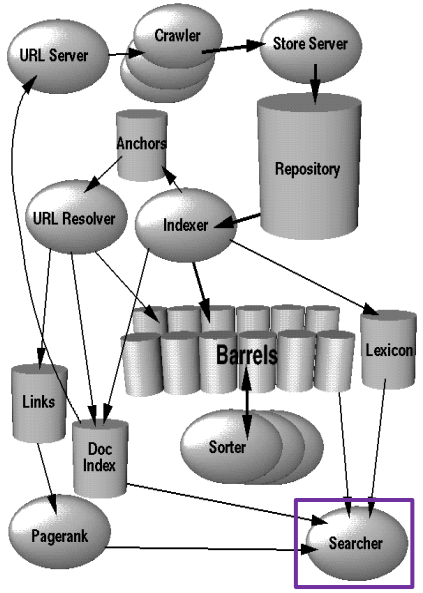
matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Commentary: The Searcher (Google's actual search function) accesses information it needs to compare the search criteria against the indexed websites. Since information about "activity" was not part of the initial white paper it is not provided, but would likely be calculated (figured) in line with how other information (e.g. lexicon, pagerank, etc.) are used to cull and ultimately rank the search results.

The sorter takes the barrels, which are sorted by docID (this is a simplification, see Section 4.2.5), and resorts them by wordID to generate the inverted index. This is done in place so that little temporary space is needed for this operation. The sorter also produces a list of wordIDs and offsets into the inverted index. A program called DumpLexicon takes this list together with the lexicon produced by the indexer and generates a new lexicon to be used by the searcher. The searcher is run by a web server and uses the lexicon built by DumpLexicon together with the inverted index and the PageRanks to answer queries.

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receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for the total activity records from the one or more search engine processors to the second computer database;

receiving the total activity records from the second computer database into the one or more search engine processors;

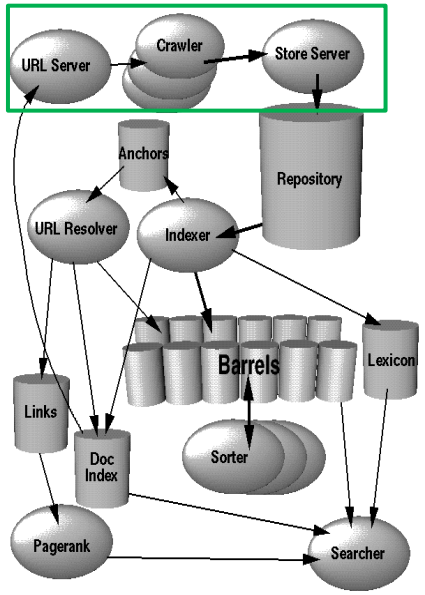
matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for the activity records from the one or more search engine processors to the third computer database;

receiving the requested activity records into the one or more search engine processors from the third computer database;



Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

Commentary: Google uses a crawler to access each website's content and analyze the words and links contained within it. In a similar way, it stands to reason that Google would use something similar to a crawler to process website related activity (e.g. logins to profile, updating of account, completeness of business information, reviews, responses, access logs, etc.). Such information would be stored alongside existing business information within the 3rd database.

CLAIM 1 (PART 3)

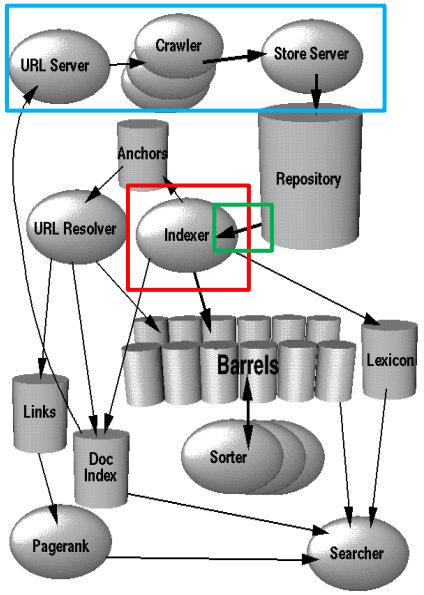
and for each requested activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the requested activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the requested activity record;

calculating a new total activity weight from the sum of the activity weight of the requested activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.



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Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

Commentary: The results of the crawling and profile login monitoring shown in previous examples would populate the Repository as well as the index (where the "various statistics" are stored).

CLAIM 1 (PART 3)

and for each requested activity record received:

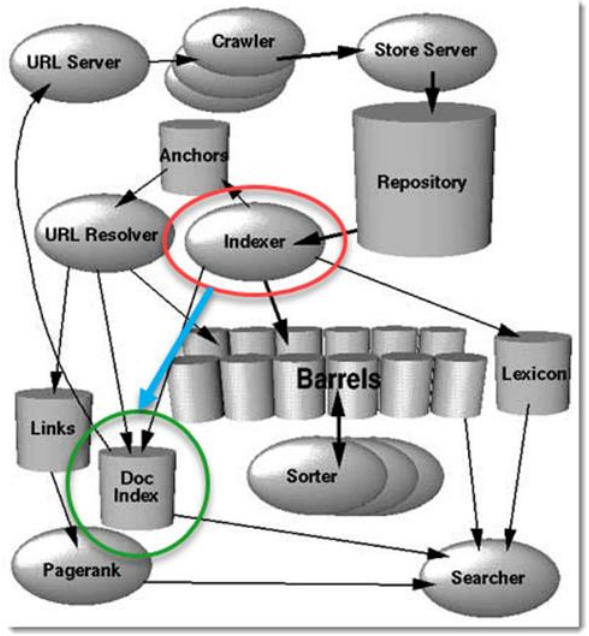
transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the requested activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the requested activity record;

calculating a new total activity weight from the sum of the activity weight of the requested activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.

In Google, the web crawling (downloading of web pages) is done by several distributed crawlers. There is a URLserver that sends lists of URLs to be fetched to the crawlers. The web pages that are fetched are then sent to the storeserver. The storeserver then compresses and stores the web pages into a repository. Every web page has an associated ID number called a docID which is assigned whenever a new URL is parsed out of a web page. The indexing function is performed by the indexer and the sorter. The indexer performs a number of functions. It reads the repository, uncompresses the documents, and parses them. Each document is converted into a set of word occurrences called hits. The hits record the word, position in document, an approximation of font size, and



Commentary: The "various statistics" stored within the Indexer would likely be sent to the Doc Index. Google states that the Document Index is where it keeps information about each document including the document status and various statistics.

Keeping with the design that activity is another ranking factor, it stands to reason that activity ranking factors would be stored with the over 200 ranking factors that Google currently implements.

Source:
http://infolab.stanford.edu/~backrub/google.html (03/18/2023)

CLAIM 1 (PART 3)

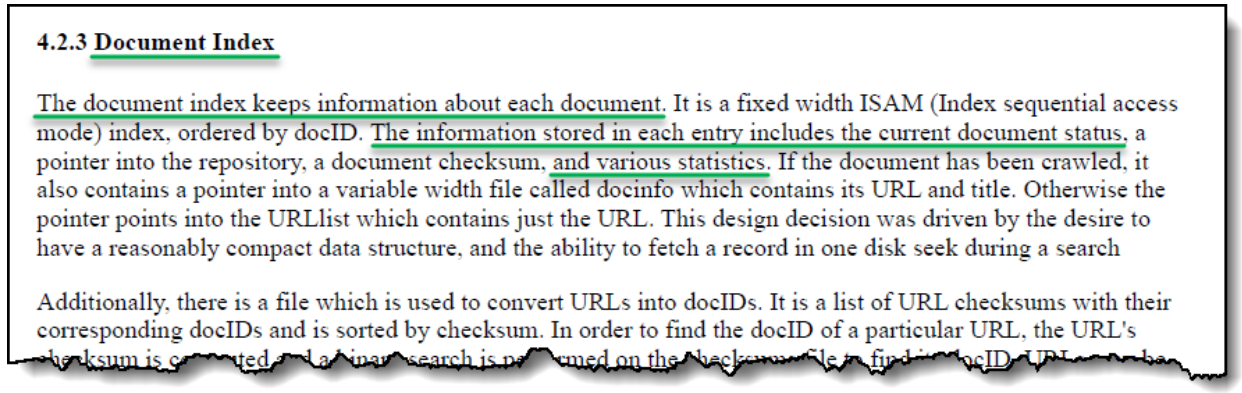
and for each requested activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the requested activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the requested activity record;

calculating a new total activity weight from the sum of the activity weight of the requested activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.



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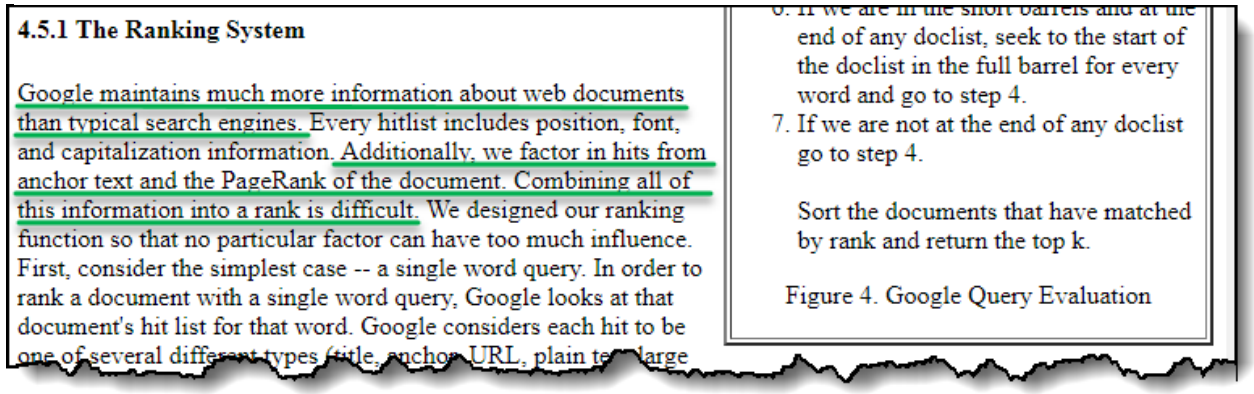
The document index keeps information about each document. It is a fixed width ISAM (Index sequential access mode) index, ordered by docID. The information stored in each entry includes the current document status, a pointer into the repository, a document checksum, and various statistics. If the document has been crawled, it also contains a pointer into a variable width file called docinfo which contains its URL and title. Otherwise the pointer points into the URLlist which contains just the URL. This design decision was driven by the desire to have a reasonably compact data structure, and the ability to fetch a record in one disk seek during a search

Additionally, there is a file which is used to convert URLs into docIDs. It is a list of URL checksums with their corresponding docIDs and is sorted by checksum. In order to find the docID of a particular URL, the URL's



4.5.1 The Ranking System

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain te large

end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.

7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

Commentary: Google states that the Document Index is where it keeps information about each document including the document status and various statistics.

Google also states that, “Google maintains much more information about web documents than typical search engines.” and “Combining all of this information into rank is difficult.”

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

CLAIM 1 (PART 3)

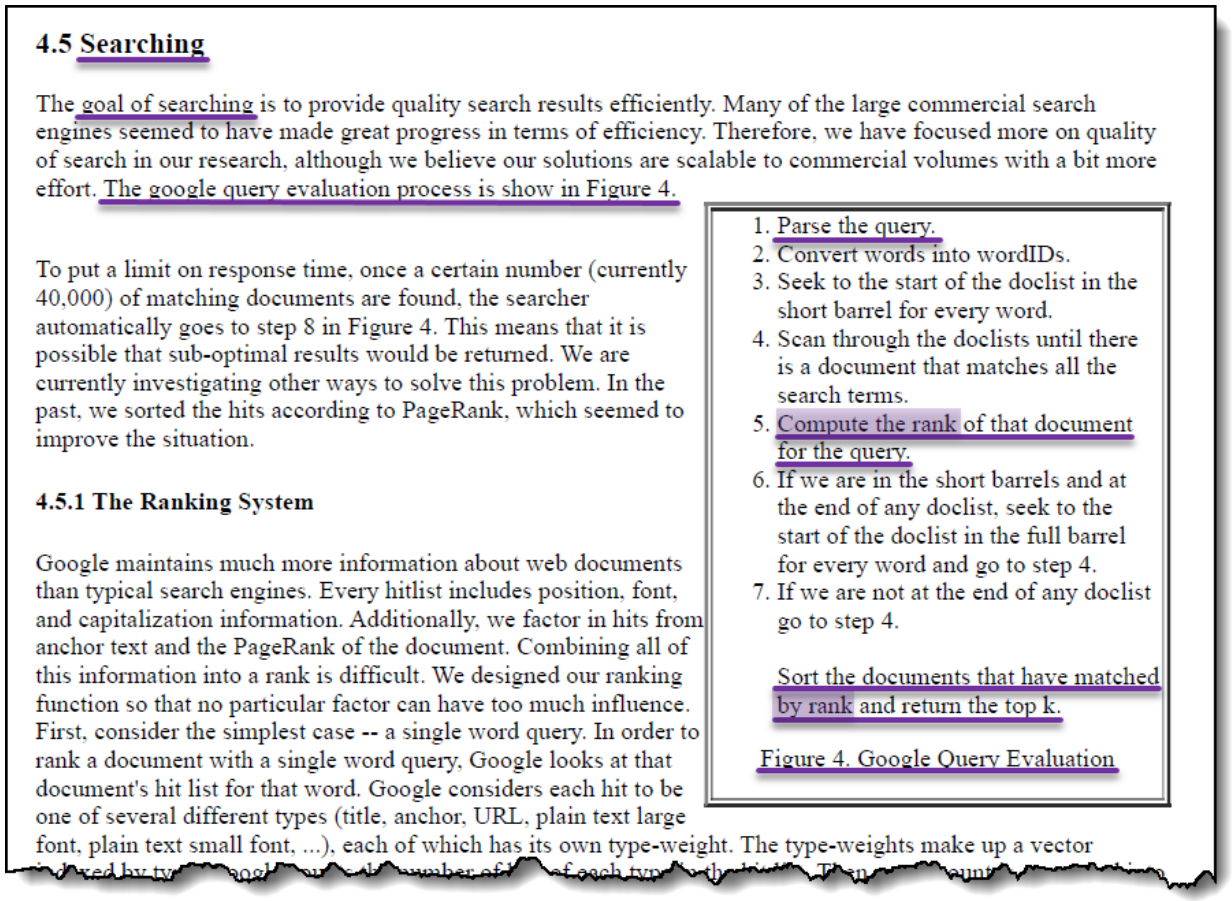
and for each requested activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the requested activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the requested activity record;

calculating a new total activity weight from the sum of the activity weight of the requested activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.



4.5 Searching

The goal of searching is to provide quality search results efficiently. Many of the large commercial search engines seemed to have made great progress in terms of efficiency. Therefore, we have focused more on quality of search in our research, although we believe our solutions are scalable to commercial volumes with a bit more effort. The google query evaluation process is show in Figure 4.

To put a limit on response time, once a certain number (currently 40,000) of matching documents are found, the searcher automatically goes to step 8 in Figure 4. This means that it is possible that sub-optimal results would be returned. We are currently investigating other ways to solve this problem. In the past, we sorted the hits according to PageRank, which seemed to improve the situation.

1. Parse the query.
2. Convert words into wordIDs.
3. Seek to the start of the doclist in the short barrel for every word.
4. Scan through the doclists until there is a document that matches all the search terms.
5. Compute the rank of that document for the query.
6. If we are in the short barrels and at the end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.
7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

4.5.1 The Ranking System

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large font, plain text small font, ...), each of which has its own type-weight. The type-weights make up a vector

Continued on next page.

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

CLAIM 1 (PART 3)

and for each requested activity record received:

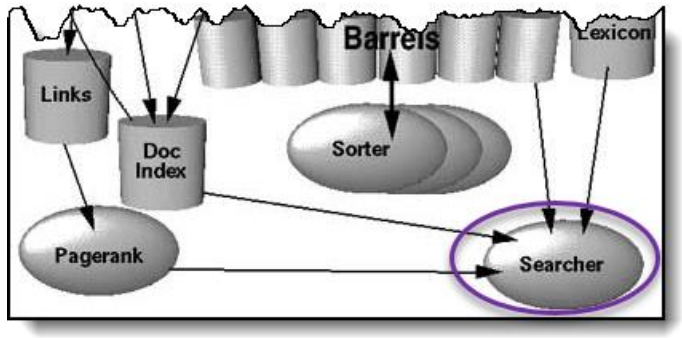
transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the requested activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the requested activity record;

calculating a new total activity weight from the sum of the activity weight of the requested activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.

Continued from previous page.



The sorter takes the barrels, which are sorted by docID (this is a simplification, see Section 4.2.5), and resorts them by wordID to generate the inverted index. This is done in place so that little temporary space is needed for this operation. The sorter also produces a list of wordIDs and offsets into the inverted index. A program called DumpLexicon takes this list together with the lexicon produced by the indexer and generates a new lexicon to be used by the searcher. The searcher is run by a web server and uses the lexicon built by DumpLexicon together with the inverted index and the PageRanks to answer queries.

Commentary: Google states that the "Google query evaluation process" will "parse the query", "compute the rank of that document for that query" and "sort the documents that have matched by rank".

Keeping with the design that activity is another ranking factor, it stands to reason that the "compute the rank of that document" process includes activity factors in addition to the over 200 well-known ranking factors that Google currently implements.

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

CLAIM 1 (PART 3)

and for each requested activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the requested activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the requested activity record;

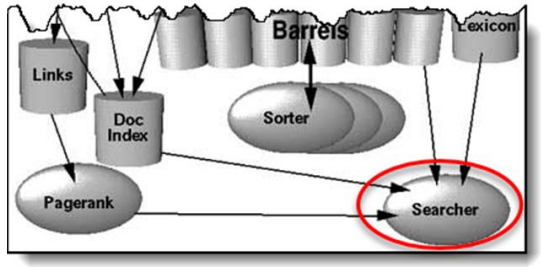
calculating a new total activity weight from the sum of the activity weight of the requested activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.

4.5 Searching

The goal of searching is to provide quality search results efficiently. Many of the large commercial search engines seemed to have made great progress in terms of efficiency. Therefore, we have focused more on quality of search in our research, although we believe our solutions are scalable to commercial volumes with a bit more effort. The google query evaluation process is show in Figure 4.

1. Parse the query.
2. Convert words into



1. Parse the query.
2. Convert words into wordIDs.
3. Seek to the start of the doclist in the short barrel for every word.
4. Scan through the doclists until there is a document that matches all the search terms.
5. Compute the rank of that document for the query.
6. If we are in the short barrels and at the end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.
7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

Commentary: The Searcher process computes the rank/weight of the documents and returns the documents in sorted order by rank/weight.

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

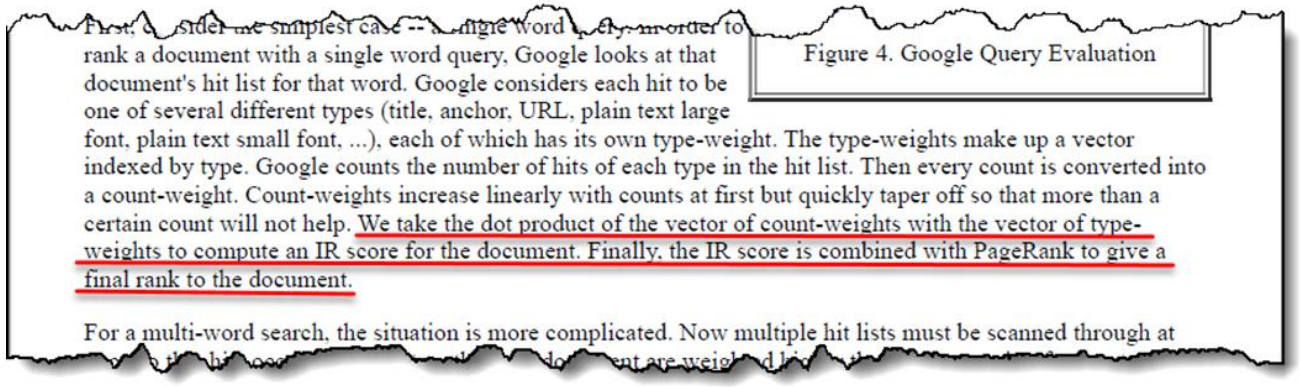
REPRESENTATIVE CLAIM 2

2. The system of claim **1**, wherein the total weight for each indexed website ID is the sum of the relevance score of the indexed website ID and the total activity weight in the matching total activity record.

CLAIM 2

The system of claim 1, wherein the total weight for each indexed website ID is the sum of the relevance score of the indexed website ID and the total activity weight in the matching total activity record.

Commentary: The Information Retrieval (IR) Score is the same as the Relevance Score. Also, PageRank is one of over 200 well known ranking factors where Activity would be included within those factors. Google states that, "the IR score is combined with PageRank to give a final rank to the document."



rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large font, plain text small font, ...), each of which has its own type-weight. The type-weights make up a vector indexed by type. Google counts the number of hits of each type in the hit list. Then every count is converted into a count-weight. Count-weights increase linearly with counts at first but quickly taper off so that more than a certain count will not help. We take the dot product of the vector of count-weights with the vector of type-weights to compute an IR score for the document. Finally, the IR score is combined with PageRank to give a final rank to the document.

For a multi-word search, the situation is more complicated.

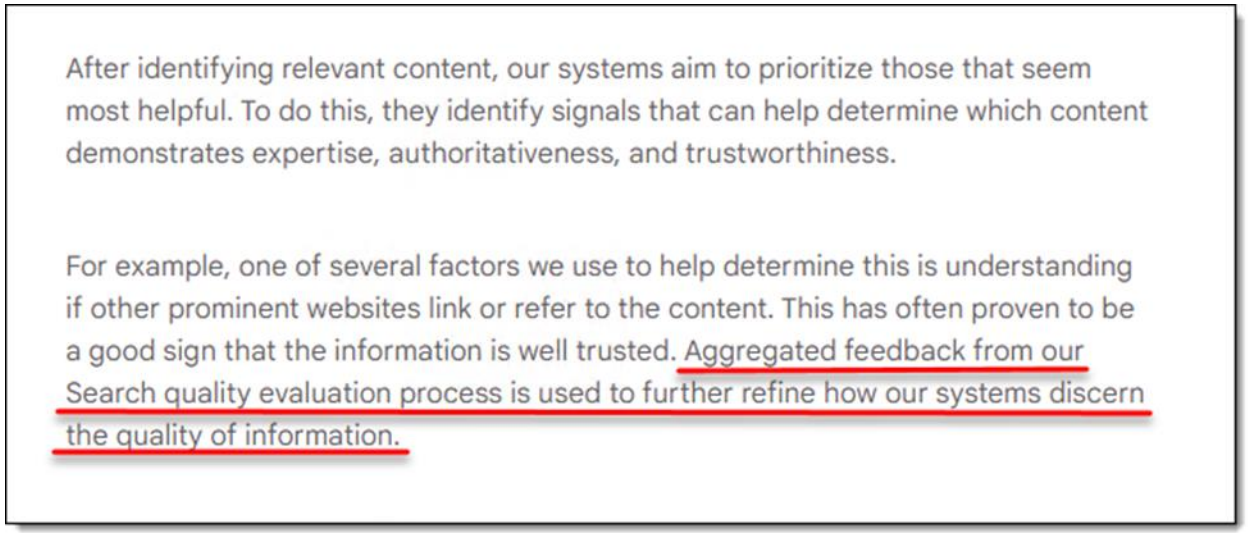
Figure 4. Google Query Evaluation

Source:
http://infolab.stanford.edu/~backrub/google.html (03/18/2023)

CLAIM 2

The system of claim 1, wherein the total weight for each indexed website ID is the sum of the relevance score of the indexed website ID and the total activity weight in the matching total activity record.

Commentary: Google refers to indexed information in the "aggregate" meaning it rolls up its "various statistics" (described previously) to speed its results ranking later that is much more time sensitive.



After identifying relevant content, our systems aim to prioritize those that seem most helpful. To do this, they identify signals that can help determine which content demonstrates expertise, authoritativeness, and trustworthiness.

For example, one of several factors we use to help determine this is understanding if other prominent websites link or refer to the content. This has often proven to be a good sign that the information is well trusted. Aggregated feedback from our Search quality evaluation process is used to further refine how our systems discern the quality of information.

Source:
https://www.google.com/search/howsearchworks/how-search-works/ranking-results/ (5/14/2023)

REPRESENTATIVE CLAIM 3

3. The system of claim **1**, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;

the website promoter publishing a tracked promoter hyperlink on a promoted webpage, the tracked promoter hyperlink being enabled to transmit a tracked request for webpage content to the tracked website;

the website promoter making a tracked relationship with another person through a tracked online social networking platform;

the website promoter removing the tracked relationship;

the website promoter sending a tracked message through the tracked online social networking platform;

the website promoter registering a domain name on a tracked domain name registry;

the website promoter creating a tracked account with the tracked website; and

the website promoter uploading tracked content to the tracked website.

CLAIM 3 (PART 1)

The system of claim 1, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

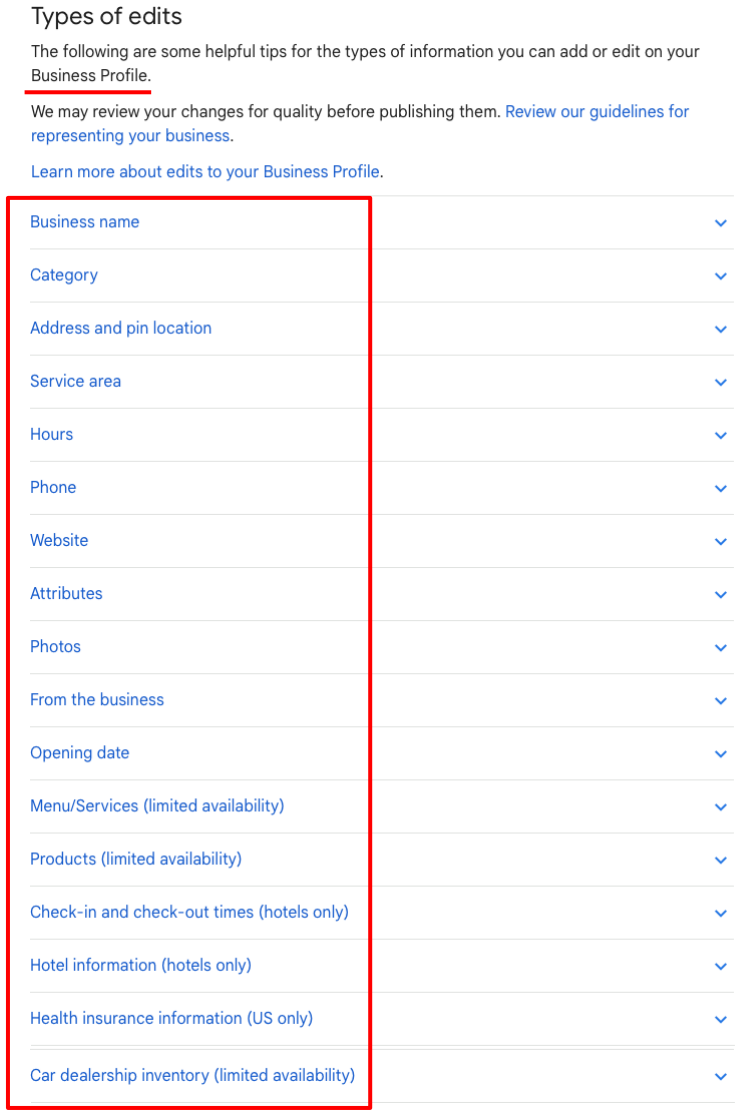
the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;



Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: Google search ties together what it can about a given website when it combines additional information given to it by business owners (authoritative sources).

For example, a given "Business Profile" with a website which Google has crawled, combined with a Google Ads account, and Google registered users (e.g. promoter ID), and other website activity such as providing hours of operation, photos, phone #, responding to reviews, etc. influence how Google ultimately ranks such a business in the search results.

CLAIM 3 (PART 1)

The system of claim 1, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

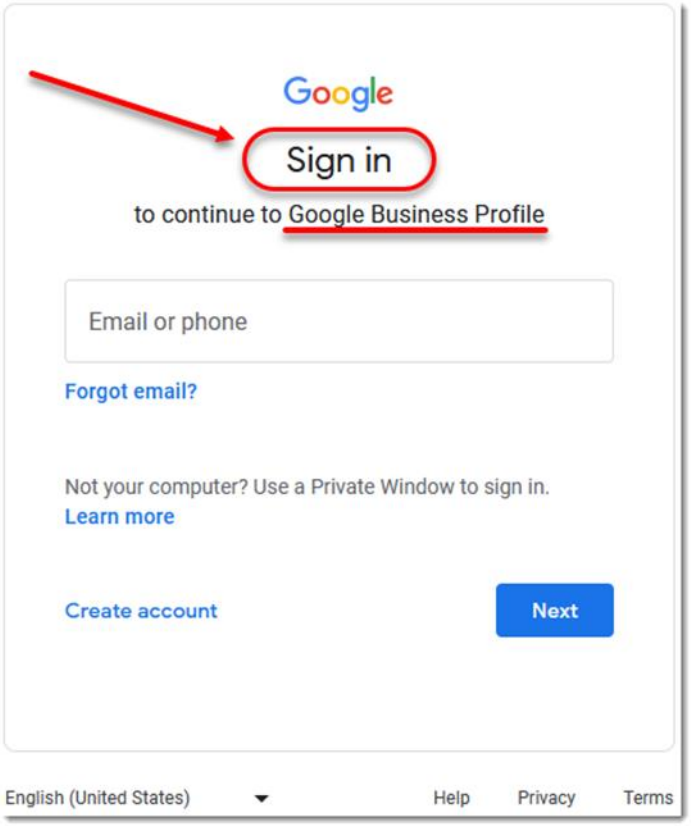
the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;



Source:
https://accounts.google.com/InteractiveLogin (4/9/2023)

Commentary: As defined throughout the patent, "*transmitting a request for **one or more recordable activity records** from the one or more search engine processor to a third computer database*" only one activity is required to satisfy Claim 3.

Although, there is sufficient evidence that suggests activity within the Business Profile influences rankings in the search results, one activity that Google clearly discloses that influences Google's rankings is the activity of logging into the promoter's Google account, which is a tracked website.

CLAIM 3 (PART 1)

The system of claim 1, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;

Verify for the first time

1. Add or claim your Business Profile on Google. Learn how to claim your profile.
2. When you add or claim your profile, you can verify it through phone, text, email, or video.
   - You may need to verify with more than one method.
   - Available methods depend on things like business category, public info, region, support hours, and volumes.
3. Pick a type of verification. Learn how to verify by your selected method.
4. Often, we need to review verifications. These reviews help maintain the integrity of all profiles. They can take up to seven business days.
   - When you're verified, you get a notification.
   - If we can't verify your business with the first method, the "Get verified" button shows up again. If this happens, try a different verification method.
5. After you verify:
   - It can take a few weeks for your updated business info to show across Google.
   - You can update and add to your info at any time. Learn how to edit your profile.
   - You can connect with your customers through your profile. Learn about posts, reviews, and messaging.

Source:
https://support.google.com/business/answer/7107242?hl=en&ref_topic=4854193 (2/10/2023)

Commentary: Google requires its claimers (promoters) to verify their businesses using multiple methods - email is one of the methods it supports.

The patent describes a pretty standard method of sending an email to verifier which includes a link back to Google that can be used to verify the user verifying has access to that email account.

Once verified, the promoter can start entering in personal and business profile information.

CLAIM 3 (PART 1)

The system of claim 1, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

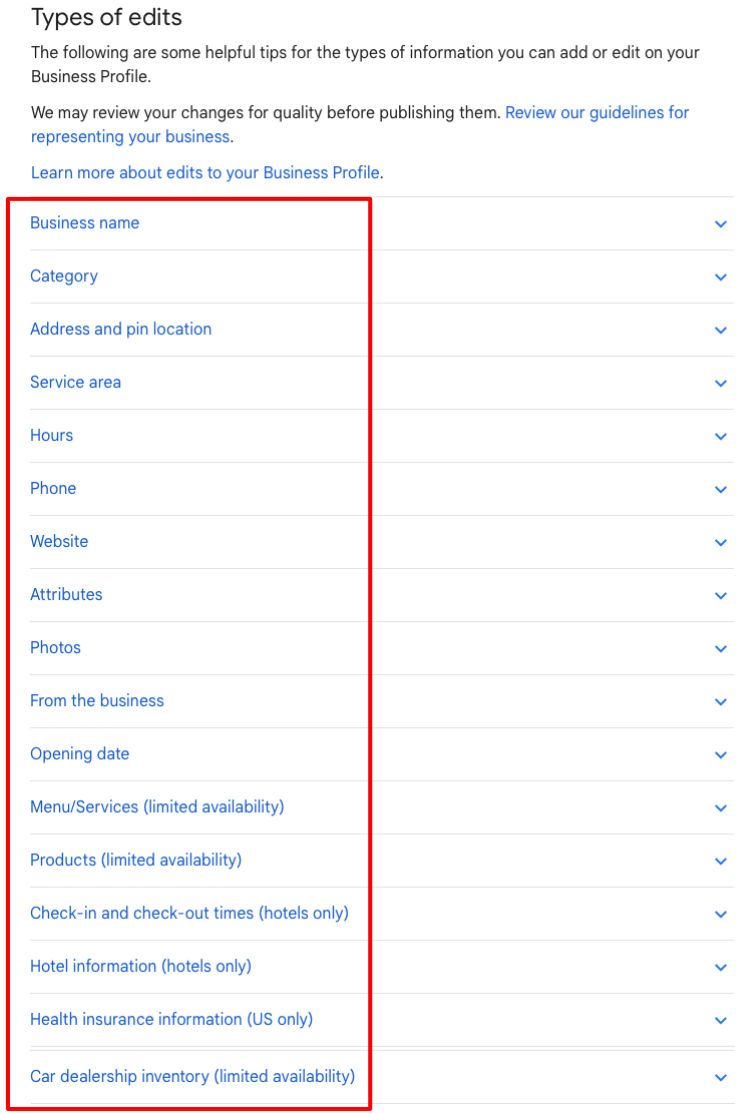
the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;



Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: Once verified, the promoter can start entering in personal and business profile information.

CLAIM 3 (PART 2)

the website promoter publishing a tracked promoter hyperlink on a promoted webpage, the tracked promoter hyperlink being enabled to transmit a tracked request for webpage content to the tracked website;

the website promoter making a tracked relationship with another person through a tracked online social networking platform;

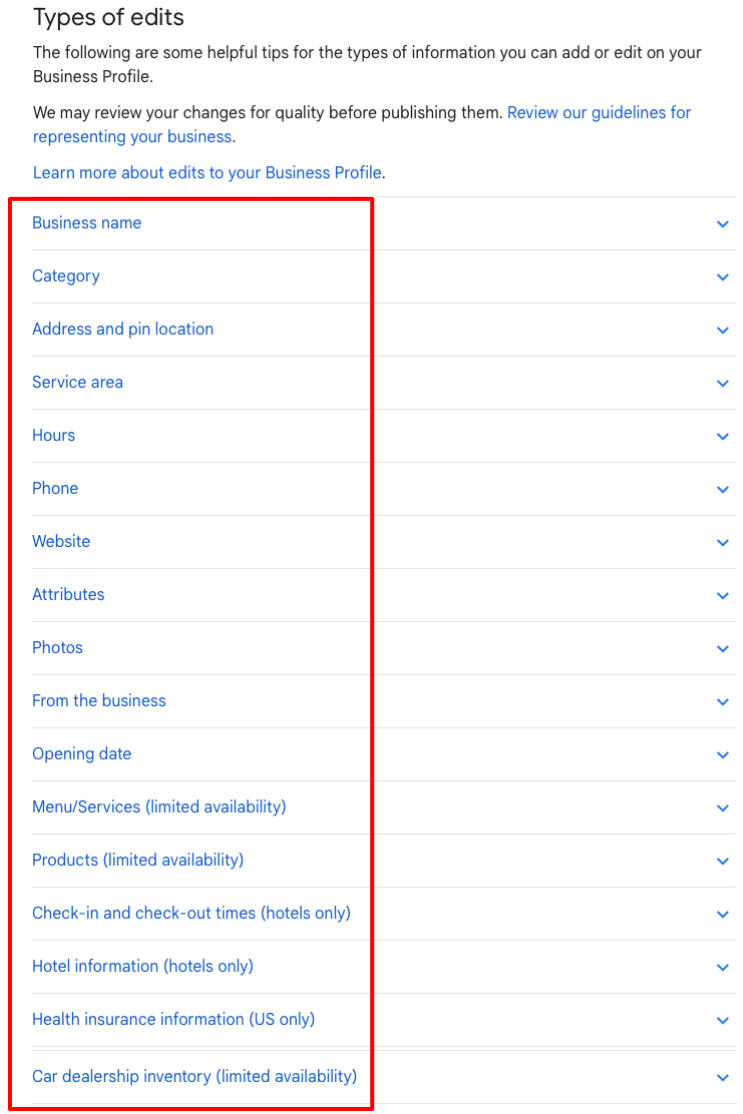
the website promoter removing the tracked relationship;

the website promoter sending a tracked message through the tracked online social networking platform;

the website promoter registering a domain name on a tracked domain name registry;

the website promoter creating a tracked account with the tracked website; and

the website promoter uploading tracked content to the tracked website.



Types of edits

The following are some helpful tips for the types of information you can add or edit on your Business Profile.

We may review your changes for quality before publishing them. Review our guidelines for representing your business.

Learn more about edits to your Business Profile.

- Business name
- Category
- Address and pin location
- Service area
- Hours
- Phone
- Website
- Attributes
- Photos
- From the business
- Opening date
- Menu/Services (limited availability)
- Products (limited availability)
- Check-in and check-out times (hotels only)
- Hotel information (hotels only)
- Health insurance information (US only)
- Car dealership inventory (limited availability)

Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: The types of information the promoter can enter about a given business depends on the type of business.

One or more promoters may be affiliated with one or more businesses as people can own more than one business and/or hire promoter(s) to oversee digital aspects of their business(s).

REPRESENTATIVE CLAIM 4

4. A method for ranking of websites comprising:

receiving a search query through a search engine network connection into one or more search engine processors, the search query comprising search criteria;

transmitting a request for website indexing records from the one or more search engine processors to a first computer database, the first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for total activity records from the one or more search engine processors to a second computer database, the second computer database comprising machine-readable memory having total activity records, each total activity record comprising an indexed website ID and a total activity weight;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

transmitting a request for one or more recordable activity records from the one or more search engine processor to a third computer database, the third computer database comprising machine-readable memory having activity records, each recordable activity record having been generated and transmitted from a tracking system to the third computer database, each recordable activity record comprising:

an affiliated website ID,

a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

an activity weight for the website activity;

wherein the tracking system comprises one or more general purpose tracking computers having a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;

receiving the one or more recordable activity records through the search engine network connection into the one or more search engine processors,

and for each recordable activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the recordable activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the recordable activity record;

calculating a new total activity weight from the sum of the activity weight of the recordable activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.

CLAIM 4 (PART 1)

A method for ranking of websites comprising:

receiving a search query through a search engine network connection into one or more search engine processors, the search query comprising search criteria;

transmitting a request for website indexing records from the one or more search engine processors to a first computer database, the first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for total activity records from the one or more search engine processors to a second computer database, the second computer database comprising machine-readable memory having total activity records, each total activity record comprising an indexed website ID and a total activity weight;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;

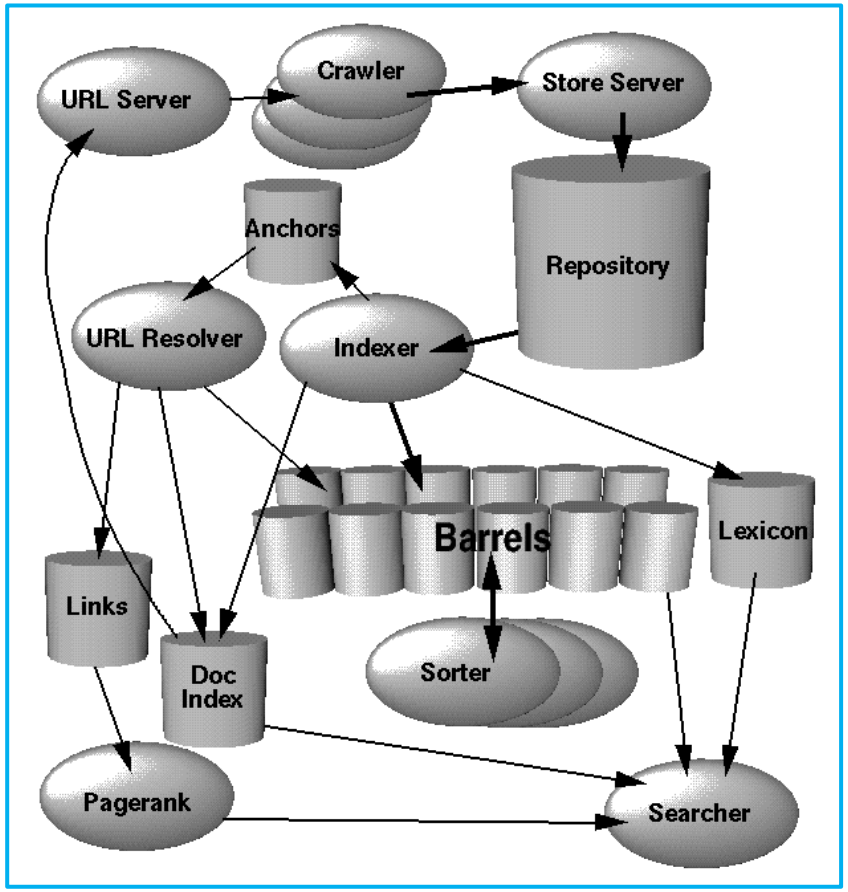


Figure 1. High Level Google Architecture

Source:
http://infolab.stanford.edu/~backrub/google.html (10/1/2022)

CLAIM 4 (PART 1)

A method for ranking of websites comprising:

receiving a search query through a search engine network connection into one or more search engine processors, the search query comprising search criteria;

transmitting a request for website indexing records from the one or more search engine processors to a first computer database, the first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

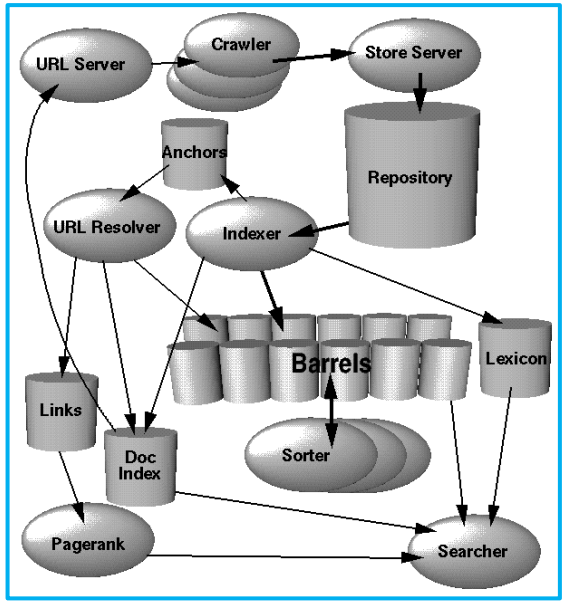
transmitting a request for total activity records from the one or more search engine processors to a second computer database, the second computer database comprising machine-readable memory having total activity records, each total activity record comprising an indexed website ID and a total activity weight;

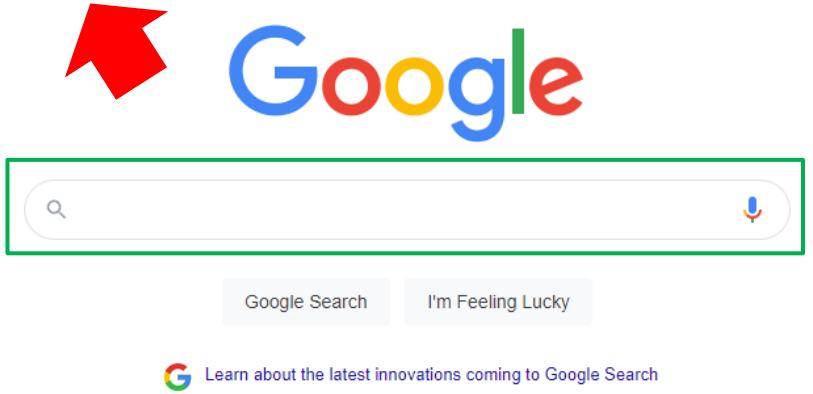
receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;





Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)
https://www.google.com (10/2/2022)

CLAIM 4 (PART 1)

A method for ranking of websites comprising:

receiving a search query through a search engine network connection into one or more search engine processors, the search query comprising search criteria;

transmitting a request for website indexing records from the one or more search engine processors to a first computer database, the first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

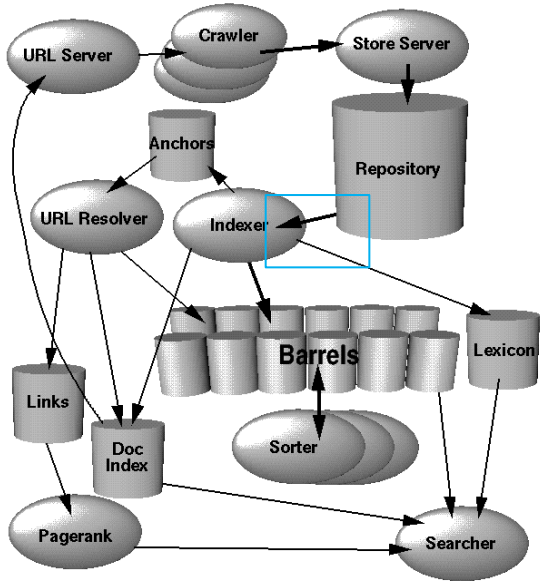
transmitting a request for total activity records from the one or more search engine processors to a second computer database, the second computer database comprising machine-readable memory having total activity records, each total activity record comprising an indexed website ID and a total activity weight;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

calculating a total weight for each indexed website ID by the one or more search engine processors, the total weight being based on the relevance score of the indexed website ID and the total activity weight in the matching total activity record;

assembling a list of the indexed website IDs ranked by the total weight of each indexed website ID by the one or more search engine processors;



Commentary: Although the arrow in the figure clearly shows data from the Repository flowing to the Indexer, the white paper clearly states that the Indexer reads from the Repository and that the indexing function is performed by the Indexer.

In Google, the web crawling (downloading of web pages) is done by several distributed crawlers. There is a URLserver that sends lists of URLs to be fetched to the crawlers. The web pages that are fetched are then sent to the storeserver. The storeserver then compresses and stores the web pages into a repository. Every web page has an associated ID number called a docID which is assigned whenever a new URL is parsed out of a web page. The indexing function is performed by the indexer and the sorter. The indexer performs a number of functions. It reads the repository, uncompresses the documents, and parses them. Each document is converted into a set of word occurrences called hits. The hits record the word, position in document, an approximation of font size, and capitalization. The indexer distributes these hits into a set of "barrels", creating a partially sorted forward index. The indexer performs another important function. It parses out all the links in every web page and stores important information about them in an anchors file. This file contains enough information to determine where each link points from and to, and the text of the link.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

CLAIM 4 (PART 1)

A method for ranking of websites comprising:

receiving a search query through a search engine network connection into one or more search engine processors, the search query comprising search criteria;

transmitting a request for website indexing records from the one or more search engine processors to a first computer database, the first computer database comprising machine-readable memory having website indexing records, each website indexing record comprising an indexed website ID and website indexing information;

receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for total activity records from the one or more search engine processors to a second computer database, the second computer database comprising machine-readable memory having total activity records, each total activity record comprising an indexed website ID and a total activity weight;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

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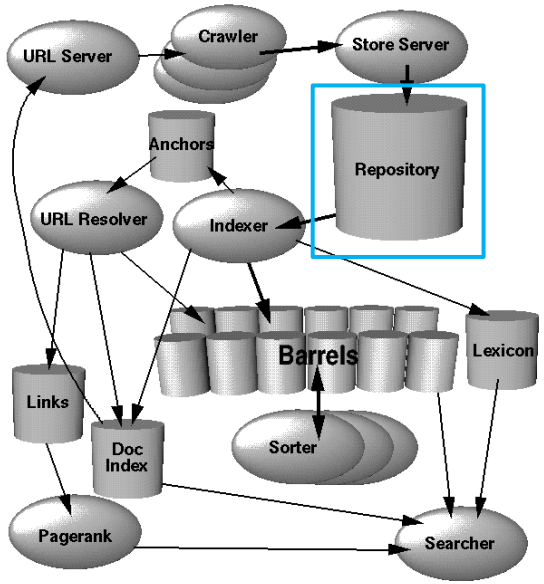

4.2.2 Repository

The repository contains the full HTML of every web page. Each page is compressed using zlib (see RFC1950). The choice of compression technique is a tradeoff between speed and compression ratio. We chose zlib's speed over a significant improvement in compression offered by bzip. The compression rate of bzip was approximately 4 to 1 on the repository as compared to zlib's 3 to 1 compression. In the repository, the documents are stored one after the other and are prefixed by docID, length, and URL as can be seen in Figure 2. The repository requires no other data structures to be used in order to access it. This helps with data consistency and makes development much easier; we can rebuild all the other data structures from only the repository and a file which lists crawler errors.

Repository: 53.5 GB = 147.8 GB uncompressed

sync	length	compressed packet
sync	length	compressed packet

...

Packet (stored compressed in repository)

docid	ecode	urllen	pagelen	url	page

Figure 2. Repository Data Structure

Source:
http://infolab.stanford.edu/~backrub/google.html (10/1/2022)

CLAIM 4 (PART 1)

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receiving the website indexing records from the first computer database into the one or more search engine processors;

calculating a relevance score for each indexed website ID by the one or more search engine processors, the relevance score being based on the search criteria and the website indexing information of each website indexing record;

transmitting a request for total activity records from the one or more search engine processors to a second computer database, the second computer database comprising machine-readable memory having total activity records, each total activity record comprising an indexed website ID and a total activity weight;

receiving the total activity records from the second computer database into the one or more search engine processors;

matching the website indexing records with the total activity records by comparing the indexed website IDs to the activity website IDs by the one or more search engine processors;

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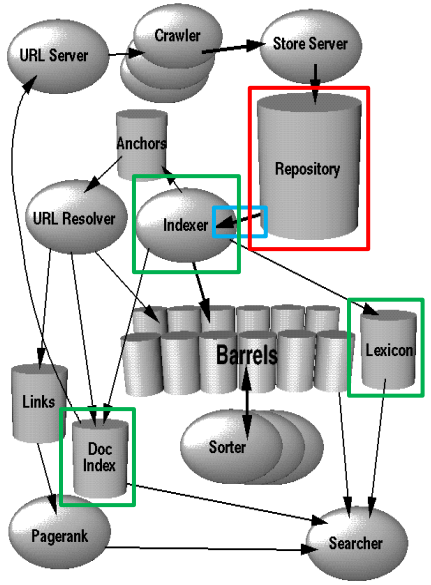

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

Commentary: The search engine processors make up the elements used by the search engine to create a list of relevant websites that closely match the original search query.

CLAIM 4 (PART 1)

A method for ranking of websites comprising:

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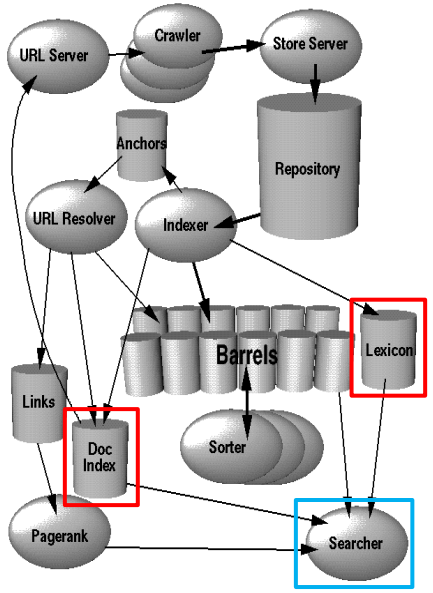

Commentary: The Searcher (Google's actual search function) uses one or more of the search engine processors (e.g. Lexicon) to "answer queries" (calculate relevance scores for each indexed website) as it compares against the original search criteria to complete the search.

The sorter takes the barrels, which are sorted by docID (this is a simplification, see Section 4.2.5), and resorts them by wordID to generate the inverted index. This is done in place so that little temporary space is needed for this operation. The sorter also produces a list of wordIDs and offsets into the inverted index. A program called DumpLexicon takes this list together with the lexicon produced by the indexer and generates a new lexicon to be used by the searcher. The searcher is run by a web server and uses the lexicon built by DumpLexicon together with the inverted index and the PageRanks to answer queries.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

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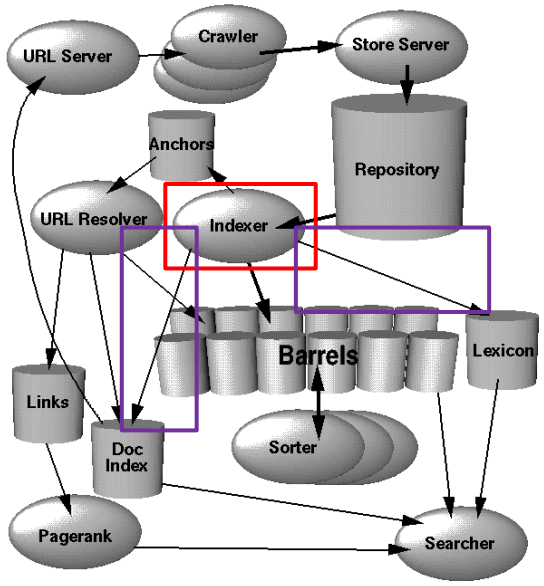

Commentary: Google's use of activity in ranking search results came well after this initial architecture (which was primarily focused on relevance), but keeping with this design, it makes sense that the Indexer would have both the total activity weight as well as a pointer (ID) to the activity record (stored in an additional database - e.g. like Repository) containing said activity to keep with its earlier design decisions around compact data structure and a single fetch of all information needed to sufficiently rank search results. It is likely that use of the words "various statistics" in this initial white paper paved the way for enhanced ranking criteria to be factored into new versions of Google search in years to come.

4.2.3 Document Index

The document index keeps information about each document. It is a fixed width ISAM (Index sequential access mode) index, ordered by docID. The information stored in each entry includes the current document status, a pointer into the repository, a document checksum, and various statistics. If the document has been crawled, it also contains a pointer into a variable width file called docinfo which contains its URL and title. Otherwise the pointer points into the URLlist which contains just the URL. This design decision was driven by the desire to have a reasonably compact data structure, and the ability to fetch a record in one disk seek during a search

Additionally, there is a file which is used to convert URLs into docIDs. It is a list of URL checksums with their corresponding docIDs and is sorted by checksum. In order to find the docID of a particular URL, the URL's checksum is computed and a binary search is performed on the checksums file to find its docID. URLs may be converted into docIDs in batch by doing a merge with this file. This is the technique the URLresolver uses to turn URLs into docIDs. This batch mode of update is crucial because otherwise we must perform one seek for every link which assuming one disk would take more than a month for our 322 million link dataset.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

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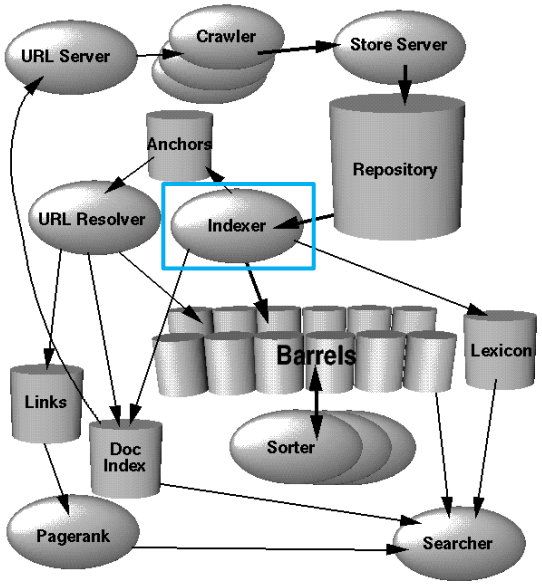

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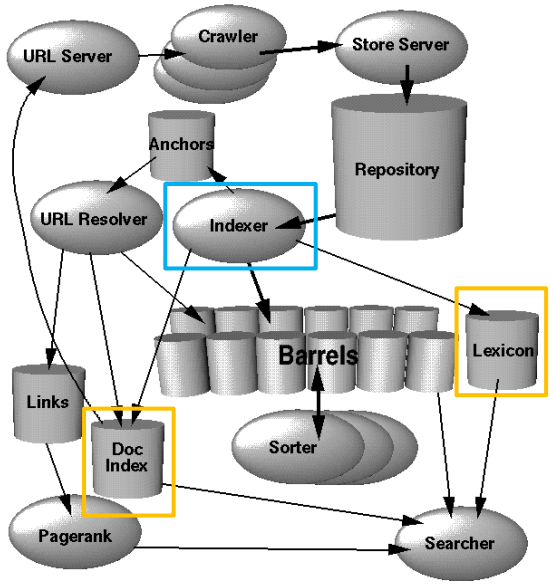

Commentary: The activity records (believed to be stored in the Indexer) are sent to the one or more search engine processors so that this information can be figured into generating the search results.

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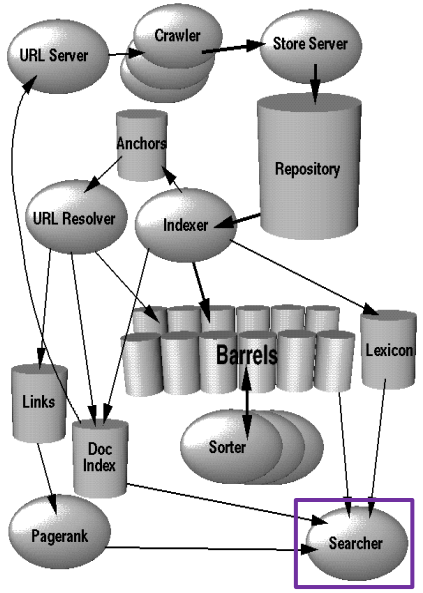


Commentary: The Searcher (Google's actual search function) accesses information it needs to compare the search criteria against the indexed websites. Since information about "activity" was not part of the initial white paper it is not provided, but would likely be calculated (figured) in line with how other information (e.g. lexicon, pagerank, etc.) are used to cull and ultimately rank the search results.

The sorter takes the barrels, which are sorted by docID (this is a simplification, see Section 4.2.5), and resorts them by wordID to generate the inverted index. This is done in place so that little temporary space is needed for this operation. The sorter also produces a list of wordIDs and offsets into the inverted index. A program called DumpLexicon takes this list together with the lexicon produced by the indexer and generates a new lexicon to be used by the searcher. The searcher is run by a web server and uses the lexicon built by DumpLexicon together with the inverted index and the PageRanks to answer queries.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

CLAIM 4 (PART 2)

transmitting a request for one or more recordable activity records from the one or more search engine processor to a third computer database, the third computer database comprising machine-readable memory having activity records, each recordable activity record having been generated and transmitted from a tracking system to the third computer database, each recordable activity record comprising:

an affiliated website ID,

a website promoter ID associated with the affiliated website ID, the website promoter ID identifying a human website promoter,

a website activity ID, the website activity ID identifying a website activity, the website activity being performed by the website promoter, and

an activity weight for the website activity;

wherein the tracking system comprises one or more general purpose tracking computers having a tracking system network connection and one or more tracking system processors, the one or more tracking system processors having computer-executable instructions for:

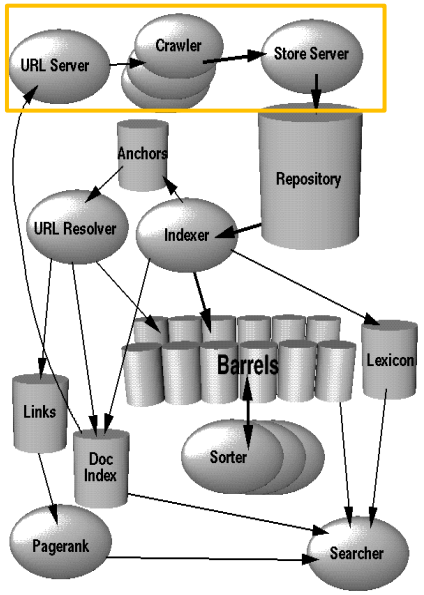
tracking the website activities through the tracking system network connection,

assembling tracked activity records, and

transmitting the tracked activity records through the tracking system network connection;

receiving the one or more recordable activity records through the search engine network connection into the one or more search engine processors,

and for each recordable activity record received:



Commentary: Google uses a crawler to access each website's content and analyze the words and links contained within it. In a similar way, it stands to reason that Google would use something similar to a crawler to process website related activity (e.g. logins to profile, updating of account, completeness of business information, reviews, responses, access logs, etc.). Such information would be stored alongside existing business information within the 3rd database.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

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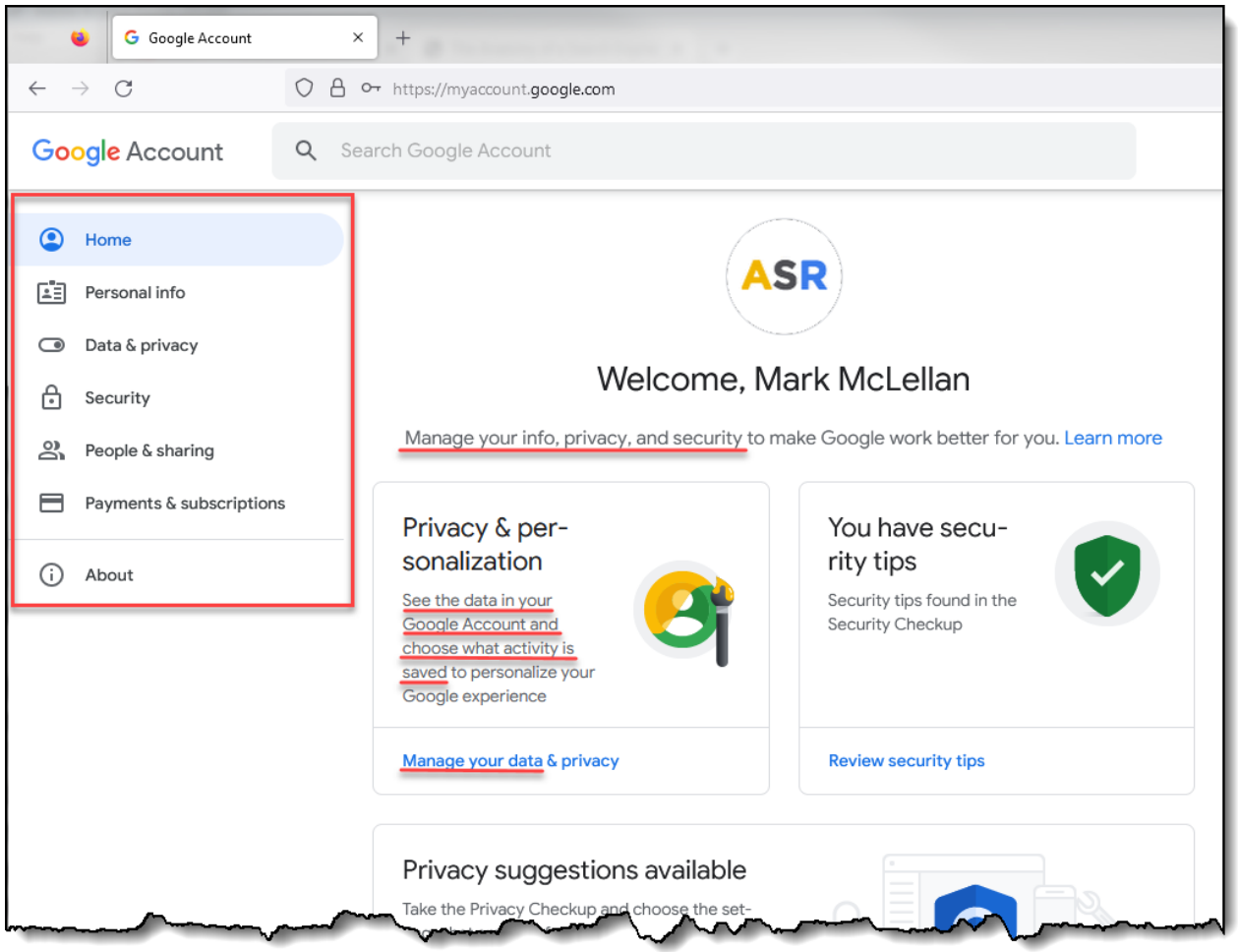

Commentary: Google stores Personal Information, Data & Privacy, Security, People & Sharing and Payments & Subscriptions information as shown on the Google Account page.

Source:
https://myaccount.google.com/ (03/11/2023)

CLAIM 4 (PART 2)

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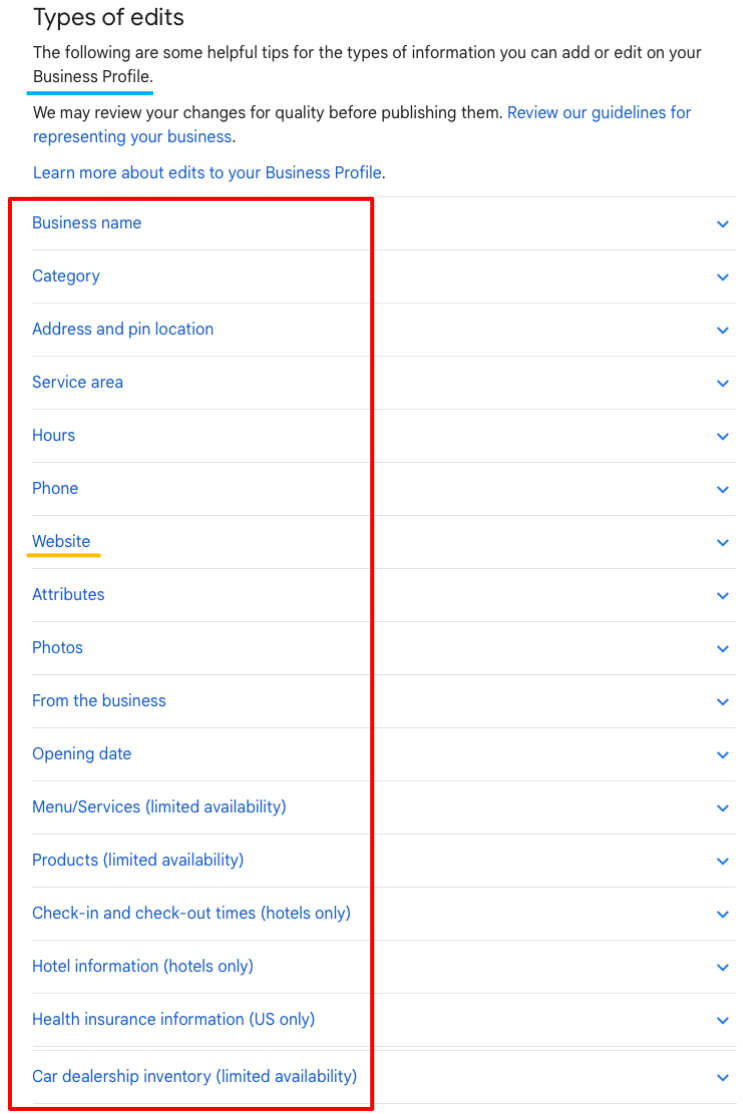

Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: Google search ties together what it can about a given website when it combines additional information given to it by business owners (authoritative sources).

For example, a given "Business Profile" with a website which Google has crawled, combined with a Google Ads account, and Google registered users (e.g. promoter ID), and other website activity such as providing hours of operation, photos, phone #, responding to reviews, etc. influence how Google ultimately ranks such a business in the search results.

CLAIM 4 (PART 2)

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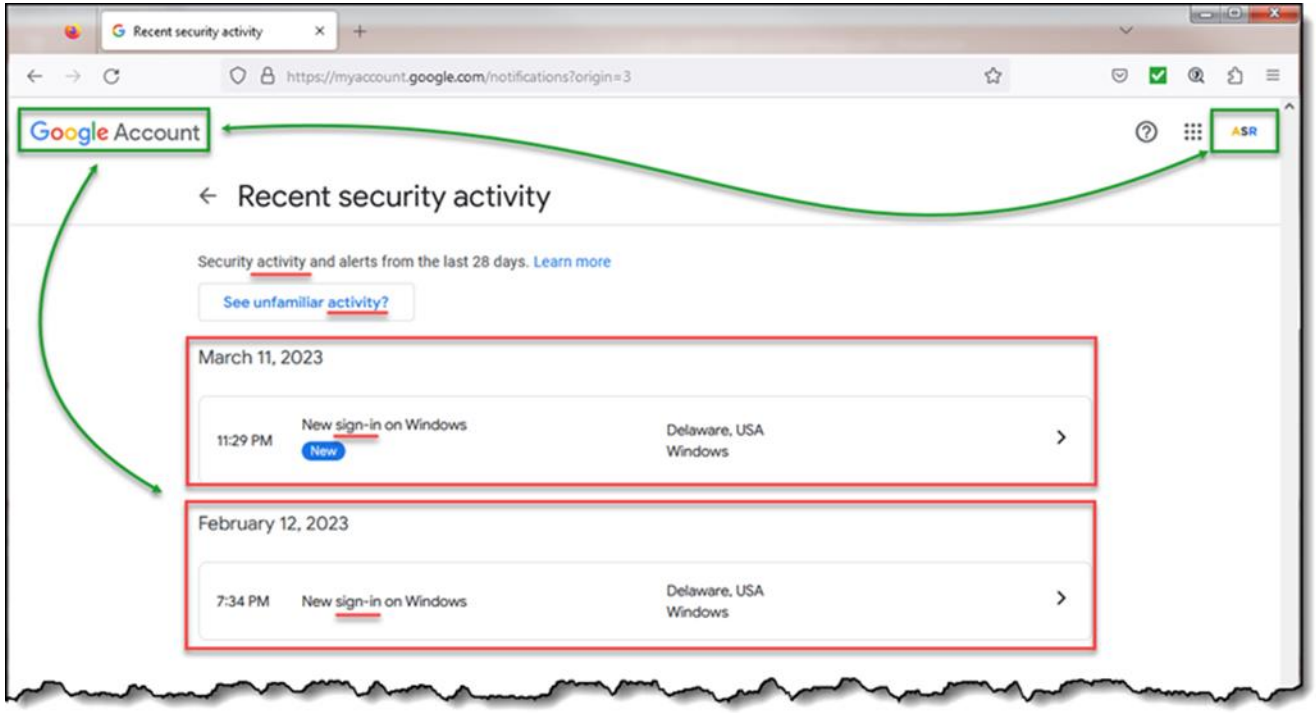

Commentary: Google maintains sign-in activity records as shown on the Google Account page. The activity records are clearly displayed as being assigned to a Google account profile.

Source:
https://myaccount.google.com/notifications?origin=3 (03/11/2023)

CLAIM 1 (PART 2)

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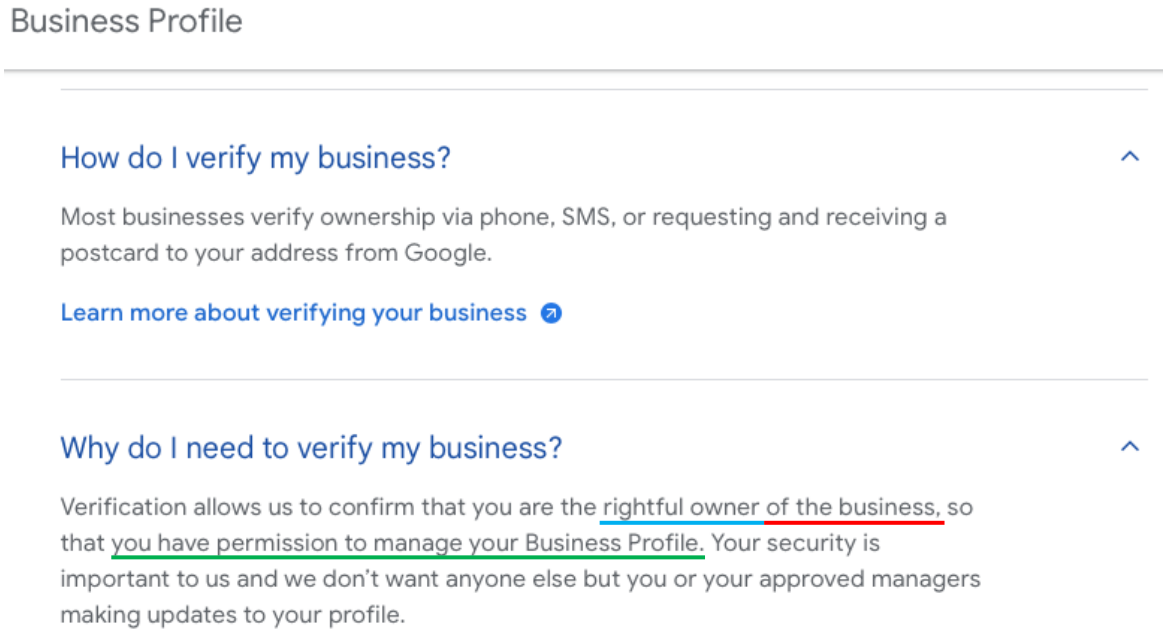

Commentary: The promoter ID is merely the user who Google recognizes as the maintainer of the business profile information. Google may well associate other information with that user should they be affiliated with multiple business profiles.

Source:
https://www.google.com/business/faq/ (10/2/2022)

CLAIM 4 (PART 2)

transmitting a request for one or more recordable activity records from the one or more search engine processor to a third computer database, the third computer database comprising machine-readable memory having activity records, each recordable activity record having been generated and transmitted from a tracking system to the third computer database, each recordable activity record comprising:

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an activity weight for the website activity;

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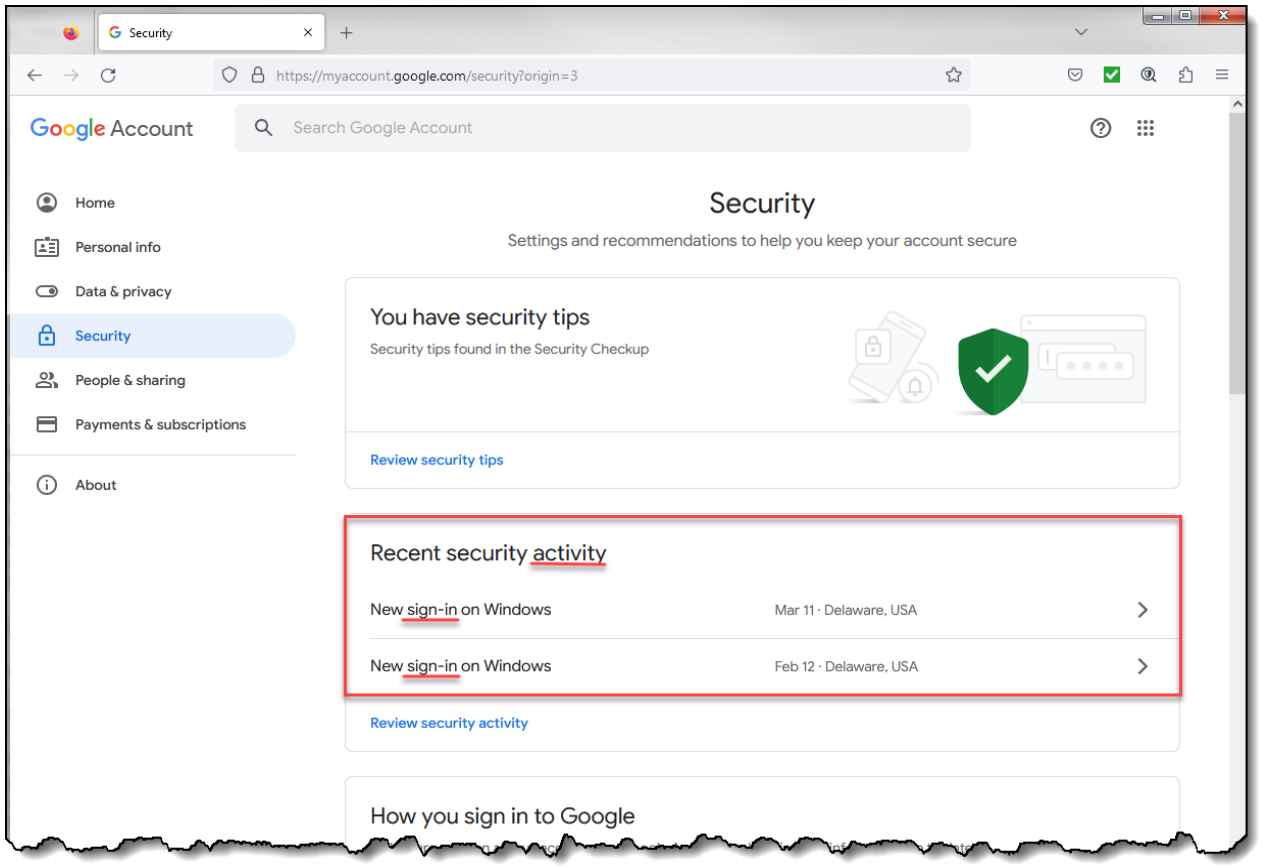

Commentary: The website activity ID is the identifier that is assigned to a website owner signing into their Google account. Sign-in activity is recorded in the Recent Security Activity section of the promoters' Google Account profile.

It is common industry practice to assign unique IDs to data records in information systems. Even if there is no unique ID assigned to the activity itself, the name of the activity is also identified by its activity name and can be considered the Activity ID.

Source:
https://myaccount.google.com/security?origin=3 (3/11/1023)

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How Google determines local ranking

Local results are based primarily on relevance, distance, and prominence. A combination of these factors helps us find the best match for your search. For example, our algorithms might decide that a business that's farther away from your location is more likely to have what you're looking for than a business that's closer, and therefore rank it higher in local results.

Relevance

Relevance refers to how well a local Business Profile matches what someone is searching for. Add complete and detailed business information to help Google better understand your business and match your profile to relevant searches.

Distance

Prominence

Prominence refers to how well known a business is. Some places are more prominent in the offline world, and search results try to reflect this in local ranking. For example, famous museums, landmark hotels, or well-known store brands are also likely to be prominent in local search results.

Prominence is also based on information that Google has about a business, from across the web, like links, articles, and directories. Google review count and review score factor into local search ranking. More reviews and positive ratings can improve your business' local ranking. Your position in web results is also a factor, so search engine optimization (SEO) best practices apply.

Tip: There's no way to request or pay for a better local ranking on Google. We do our best to keep the search algorithm details confidential, to make the ranking system as fair as possible for everyone.

Source:
https://support.google.com/business/answer/7091?hl=en#zippy=%2Cprominence (10/2/1022)

Commentary: Google Business Profile represents datastore (e.g. database) containing individual records for each business which are likely associated with their own unique ID which Google then can associate various information (each of which when updated or interacted with could represent “activity”) about each business (from an authoritative source - the business owner). Google can then connect the dots with other information it already has to deliver a fairly comprehensive and legit search record about that business.

CLAIM 4 (PART 2)

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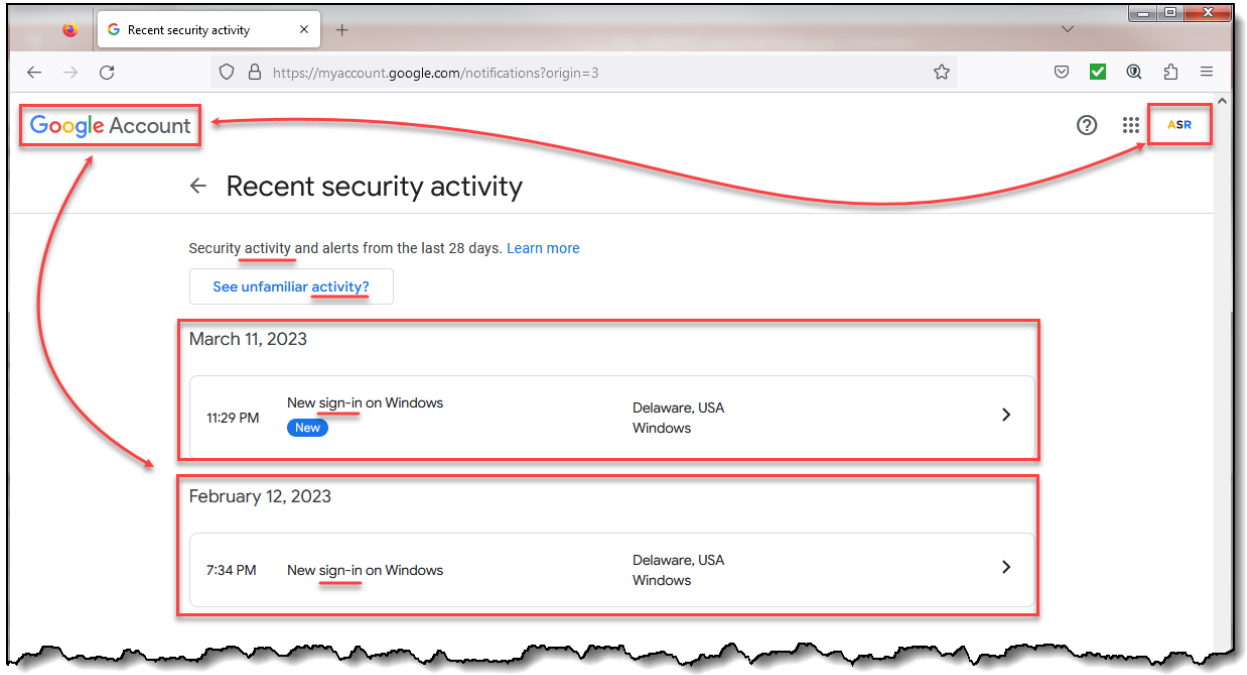

Commentary: The website activity of sign-in is being performed by the website promoter shown in the Google Account Recent security activity page.

Source:
https://myaccount.google.com/security?origin=3 (3/11/1023)

CLAIM 4 (PART 2)

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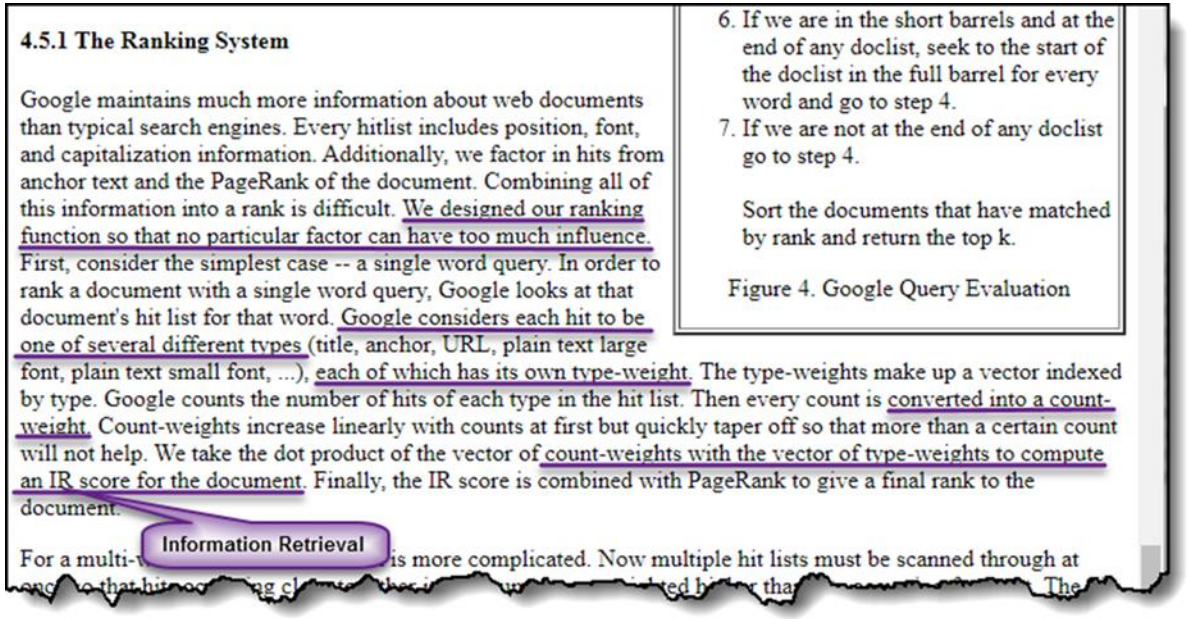

4.5.1 The Ranking System

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large font, plain text small font, ...), each of which has its own type-weight. The type-weights make up a vector indexed by type. Google counts the number of hits of each type in the hit list. Then every count is converted into a count-weight. Count-weights increase linearly with counts at first but quickly taper off so that more than a certain count will not help. We take the dot product of the vector of count-weights with the vector of type-weights to compute an IR score for the document. Finally, the IR score is combined with PageRank to give a final rank to the document.

Information Retrieval

For a multi- is more complicated. Now multiple hit lists must be scanned through at

6. If we are in the short barrels and at the end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.
7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

Commentary: Google's ranking system uses weighting extensively on each and every aspect being considered - for example, just reviewing the hit types, Google associates a weight to each and every hit type. Google's blog post shown on the next slide will show that "activity" weighting is being applied to the "Login" activity.

Source:
http://infolab.stanford.edu/~backrub/google.html (03/11/2023)

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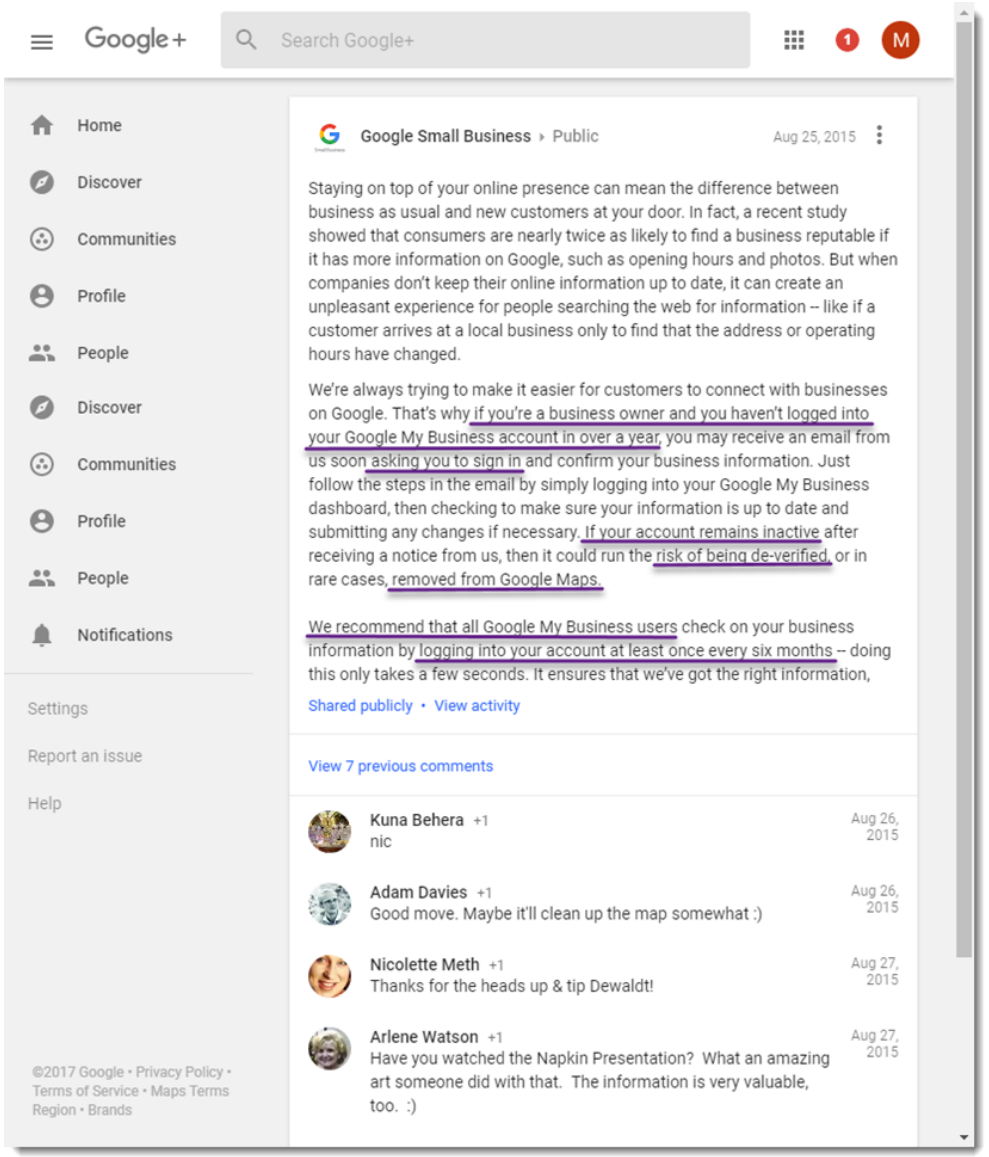

Source:
https://plus.google.com/115200251016762857369 (09/18/2017)

Commentary: As Google's blog post clearly states, the login activity determines if the website runs the "risk of being de-verified." De-verification would require some type of weight in order to determine its position in the rankings.

As Google stated in the previous page, "We design our ranking function so that no particular factor can have too much influence."

These stated facts would highly suggest that the login activity factor influences rankings without completely removing the website from the search results.

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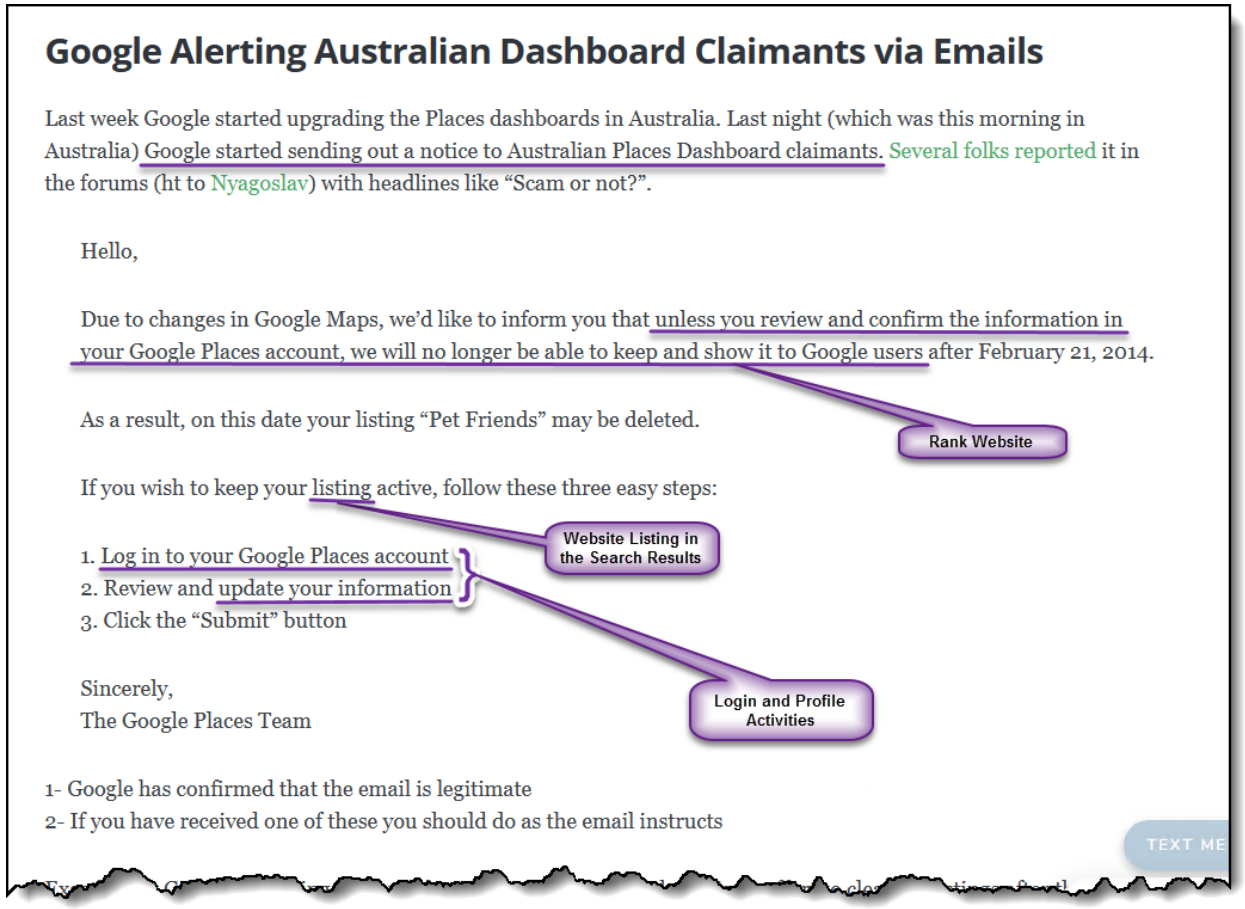

Commentary: Google sent out emails to their Australian users of Google Places. The email clearly states that the login and profile update activities both determine if the website listing ranks.

The email from Google shows that the promoter's activity directly influences Google's ranking results of the promoter's website listing.

Source
https://blumenthals.com/blog/2014/02/03/google-alerting-australian-dashboard-claimants-via-emails/ (05/19/2023)

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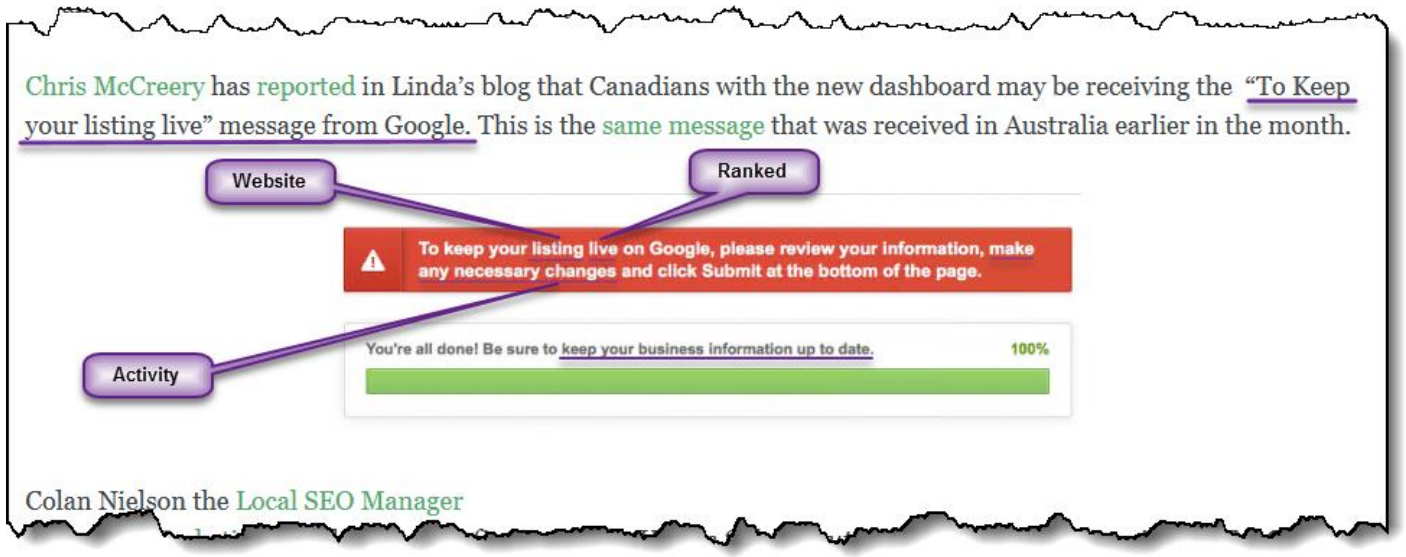

Commentary: Google sent out the same "To Keep your listing live" message to Canadian users that Google sent to their Australian users of Google Places as an email.

The message clearly states that if the promoter wants their website ranked, they must engage in promoter activity.

Source
https://blumenthals.com/blog/2014/02/21/canadian-dashboards-now-receiving-warning-it-is-not-the-canadian-placopalypse/ (05/19/2023)

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Source:
https://support.google.com/business/answer/7091?hl=en#zippy=%2Cprominence (10/2/1022)

Commentary: The next three pages show that Google factors into its algorithm "business profile activity" - particularly completeness of business information provided by the business owner as well as the owners interaction with their business profile (e.g., managing profile). Due to the need for speeding search results mentioned earlier, such information must be "summed up" pretty regularly to some quantifiable figure (e.g., activity weight) that can be easily combined with other search criteria (e.g., relevance, distance, and prominence) to allow Google to adequately rank the search results speedily.

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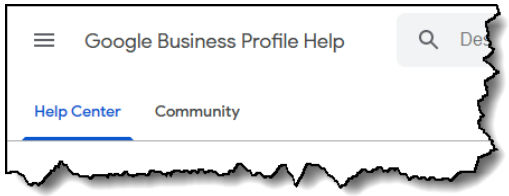

Commentary: Google clearly states on their "Google Business Profile Help" page that "To make sure your business is eligible to show up on Google, verify your Business Profile."

Verifying your Business Profile requires an account to be created and is considered a promoter activity. After creating the account, the promoter's website is eligible for ranking in the search results which would require some type of weighting signal.

Source:
https://support.google.com/business/answer/2911778?hl=en_(5/19/1023)

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Commentary: According to Kevin Rowe at the Search Engine Journal, creating (claiming) a Google Business Profile, promoter activity, is the number one ranking signal that will help improve local SEO, Search Engine Optimization, i.e., Search Engine Rankings.

Source:
https://www.searchenginejournal.com/local-seo/local-search-ranking-signals/ (5/19/1023)

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Commentary: According to Safari Digital's "9 Local SEO Ranking Factors 2023" the most crucial local Search Engine Optimization ranking factor is with the promoter performing the creating an account activity (setting up) for a Google Business Profile (formally GMB). In addition, listing, verifying and managing are other activities listed as crucial promoter activities for a positive influence on rankings.

Source:
https://www.safaridigital.com.au/blog/local-seo-ranking-factors/ (5/19/1023)

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Figure 4. Google Query Evaluation

Commentary: Google's ranking system uses weighting extensively on each and every aspect being considered - for example just reviewing the hit types, Google associates a weight to each and every hit type. Thus it is likely that factoring in "activity" weighting is also used.

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

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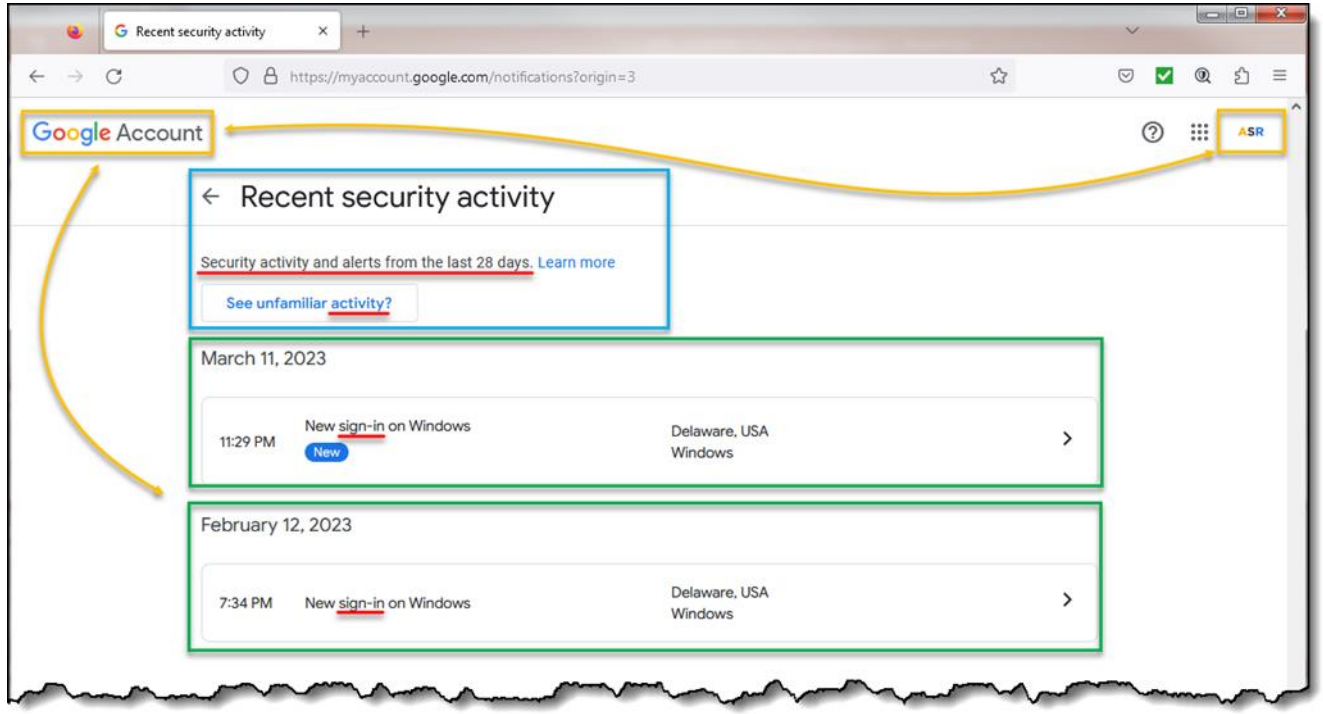

Commentary: A tracking system is presented on the "Recent security activity" page within the business owners profile account. Sign-in activity records are clearly tracked, assembled and transmitted to the promoter and presented on this page.

Source:
https://support.google.com/business/answer/2721884 (10/2/2022)

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How Google sources business information

Information in profiles is compiled from a variety of sources:

- **Publicly-available information**, such as crawled web content (e.g., information from a business' official website)
- **Licensed data from third parties**
- **Users** who contribute factual information (such as addresses and phone numbers), and content (such as photos and reviews), including business owners who claim profiles through Google Business Profile
- **Information based on Google's interactions with a local place or business**

If you believe a profile is inaccurate or should be removed, you can suggest an edit or flag it for removal. If you believe a profile should be removed under European data protection laws, please see here. If you believe it should be removed for any other legal reason, please submit a legal request. For further information about how Google processes personal data in the context of profiles, please see Google's Privacy Policy.

Information in local search results

Google uses business information to help surface relevant local search results across Google, such as in Google Maps and Search.

For example, if you own a hair salon, your business might appear in local search results for people who search for "salons near me" or "salons open now" because you've provided information that includes your address and hours. Learn more about local search results.

Source:
https://support.google.com/business/answer/2721884 (10/2/2022)

Commentary: It seems likely, Google would use its existing crawler or login interface to monitor (e.g. track) changes to business profile information, reviews, and other sources of business information, compile these changes (if any) using its latest algorithm, and then save the compiled (e.g. weighted) result in the appropriate place(s) to speed follow on searches.

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assembling tracked activity records, and

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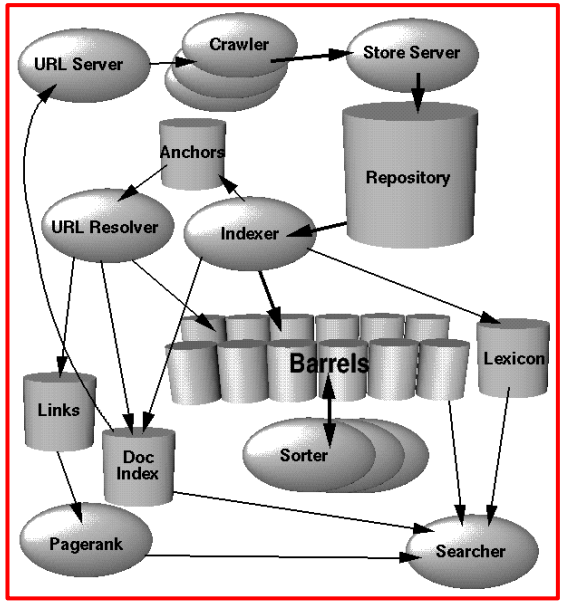
receiving the one or more recordable activity records through the search engine network connection into the one or more search engine processors,



Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

Commentary: Search engine processors make up the entire Google high level architecture for searching the Internet - no one processor in the architecture is less important than the other.

CLAIM 4 (PART 3)

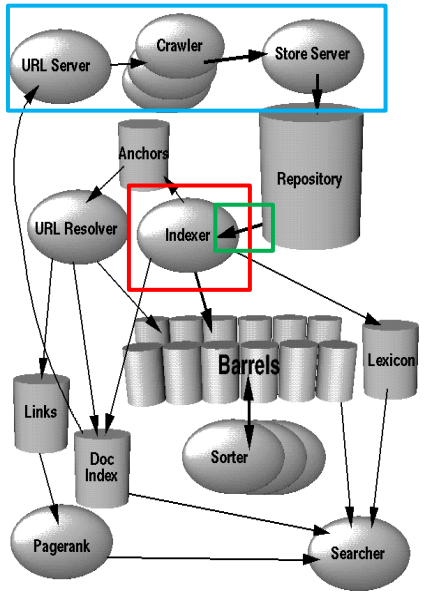
and for each recordable activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the recordable activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the recordable activity record;

calculating a new total activity weight from the sum of the activity weight of the recordable activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.



Commentary: The results of the crawling would populate the Repository as well as the index (where the "various statistics" are stored).

In Google, the web crawling (downloading of web pages) is done by several distributed crawlers. There is a URLserver that sends lists of URLs to be fetched to the crawlers. The web pages that are fetched are then sent to the storeserver. The storeserver then compresses and stores the web pages into a repository. Every web page has an associated ID number called a docID which is assigned whenever a new URL is parsed out of a web page. The indexing function is performed by the indexer and the sorter. The indexer performs a number of functions. It reads the repository, uncompresses the documents, and parses them. Each document is converted into a set of word occurrences called hits. The hits record the word, position in document, an approximation of font size, and

Source:
http://infolab.stanford.edu/~backrub/google.html (10/2/2022)

CLAIM 4 (PART 3)

and for each recordable activity record received:

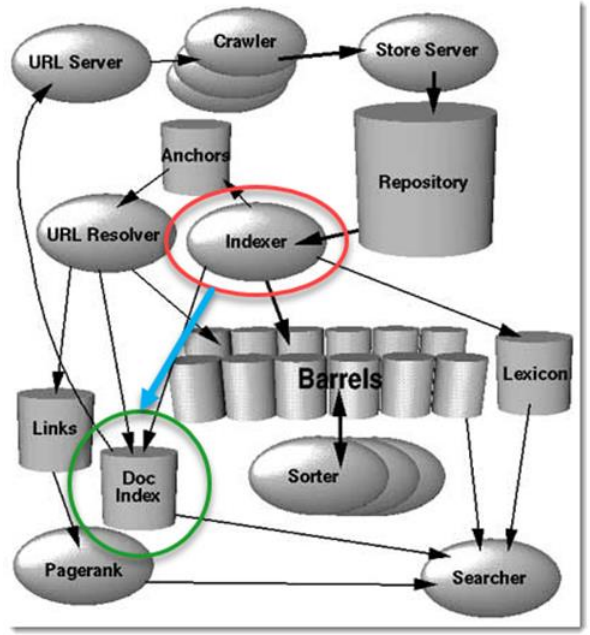
transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the recordable activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the recordable activity record;

calculating a new total activity weight from the sum of the activity weight of the recordable activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.

In Google, the web crawling (downloading of web pages) is done by several distributed crawlers. There is a URLserver that sends lists of URLs to be fetched to the crawlers. The web pages that are fetched are then sent to the storeserver. The storeserver then compresses and stores the web pages into a repository. Every web page has an associated ID number called a docID which is assigned whenever a new URL is parsed out of a web page. The indexing function is performed by the indexer and the sorter. The indexer performs a number of functions. It reads the repository, uncompresses the documents, and parses them. Each document is converted into a set of word occurrences called hits. The hits record the word, position in document, an approximation of font size, and



Commentary: The "various statistics" stored within the Indexer would likely be sent to the Doc Index. Google states that the Document Index is where it keeps information about each document including the document status and various statistics.

Keeping with the design that activity is another ranking factor, it stands to reason that activity ranking factors would be stored with the over 200 ranking factors that Google currently implements.

Source:
http://infolab.stanford.edu/~backrub/google.html (03/18/2023)

CLAIM 4 (PART 3)

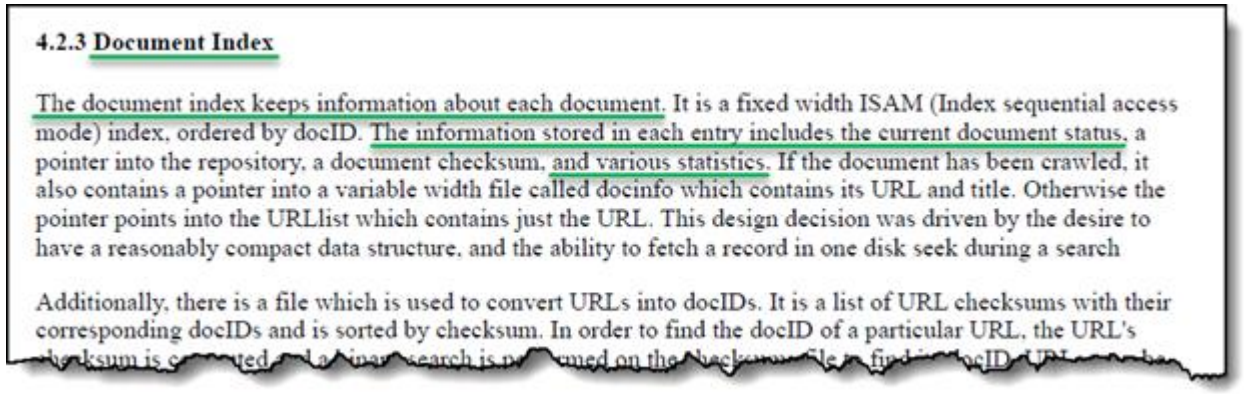
and for each recordable activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the recordable activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the recordable activity record;

calculating a new total activity weight from the sum of the activity weight of the recordable activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

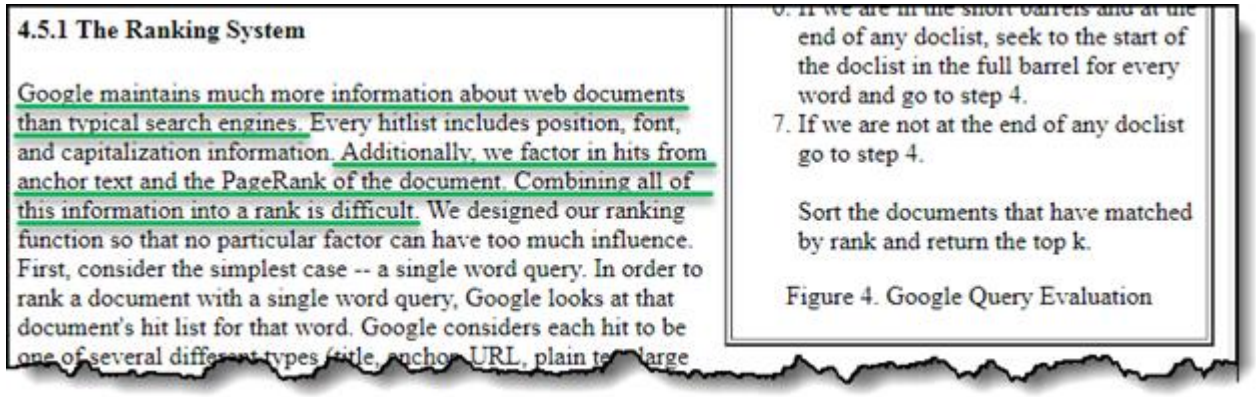
transmitting the new total activity weight from the one or more search engine processors to the second computer database.



4.2.3 Document Index

The document index keeps information about each document. It is a fixed width ISAM (Index sequential access mode) index, ordered by docID. The information stored in each entry includes the current document status, a pointer into the repository, a document checksum, and various statistics. If the document has been crawled, it also contains a pointer into a variable width file called docinfo which contains its URL and title. Otherwise the pointer points into the URLlist which contains just the URL. This design decision was driven by the desire to have a reasonably compact data structure, and the ability to fetch a record in one disk seek during a search

Additionally, there is a file which is used to convert URLs into docIDs. It is a list of URL checksums with their corresponding docIDs and is sorted by checksum. In order to find the docID of a particular URL, the URL's



4.5.1 The Ranking System

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large

end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.

7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

Commentary: Google states that the Document Index is where it keeps information about each document including the document status and various statistics.

Google also states that, “Google maintains much more information about web documents than typical search engines.” and “Combining all of this information into rank is difficult.”

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

CLAIM 4 (PART 3)

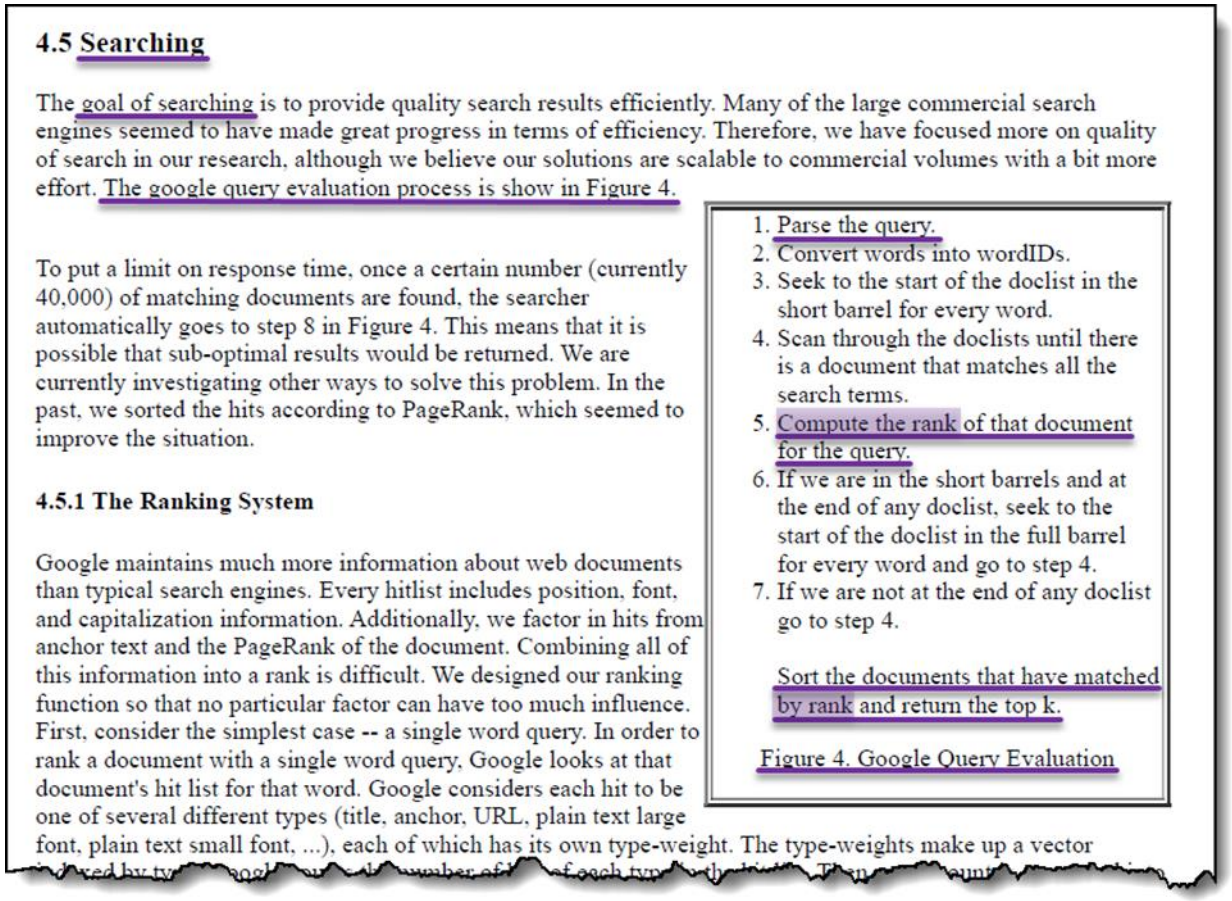
and for each recordable activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the recordable activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the recordable activity record;

calculating a new total activity weight from the sum of the activity weight of the recordable activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.



4.5 Searching

The goal of searching is to provide quality search results efficiently. Many of the large commercial search engines seemed to have made great progress in terms of efficiency. Therefore, we have focused more on quality of search in our research, although we believe our solutions are scalable to commercial volumes with a bit more effort. The google query evaluation process is show in Figure 4.

To put a limit on response time, once a certain number (currently 40,000) of matching documents are found, the searcher automatically goes to step 8 in Figure 4. This means that it is possible that sub-optimal results would be returned. We are currently investigating other ways to solve this problem. In the past, we sorted the hits according to PageRank, which seemed to improve the situation.

1. Parse the query.
2. Convert words into wordIDs.
3. Seek to the start of the doclist in the short barrel for every word.
4. Scan through the doclists until there is a document that matches all the search terms.
5. Compute the rank of that document for the query.
6. If we are in the short barrels and at the end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.
7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

4.5.1 The Ranking System

Google maintains much more information about web documents than typical search engines. Every hitlist includes position, font, and capitalization information. Additionally, we factor in hits from anchor text and the PageRank of the document. Combining all of this information into a rank is difficult. We designed our ranking function so that no particular factor can have too much influence. First, consider the simplest case -- a single word query. In order to rank a document with a single word query, Google looks at that document's hit list for that word. Google considers each hit to be one of several different types (title, anchor, URL, plain text large font, plain text small font, ...), each of which has its own type-weight. The type-weights make up a vector

Continued on next page.

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

CLAIM 4 (PART 3)

Continued from previous page.

and for each recordable activity record received:

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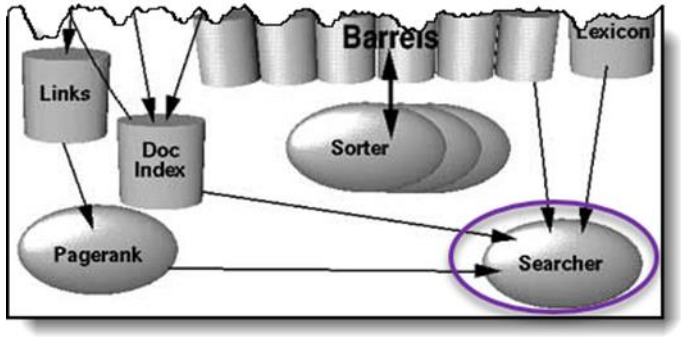
calculating a new total activity weight from the sum of the activity weight of the recordable activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.



The sorter takes the barrels, which are sorted by docID (this is a simplification, see Section 4.2.5), and resorts them by wordID to generate the inverted index. This is done in place so that little temporary space is needed for this operation. The sorter also produces a list of wordIDs and offsets into the inverted index. A program called DumpLexicon takes this list together with the lexicon produced by the indexer and generates a new lexicon to be used by the searcher. The searcher is run by a web server and uses the lexicon built by DumpLexicon together with the inverted index and the PageRanks to answer queries.

Commentary: Google states that the "Google query evaluation process" will "parse the query", "compute the rank of that document for that query" and "sort the documents that have matched by rank".

Keeping with the design that activity is another ranking factor, it stands to reason that the "compute the rank of that document" process includes activity factors in addition to the over 200 well-known ranking factors that Google currently implements.

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

CLAIM 4 (PART 3)

and for each recordable activity record received:

transmitting a request for a total activity record from the one or more search engine processors to the second computer database, the request comprising the affiliated website ID of the recordable activity record;

receiving the requested total activity record from the second computer database into the one or more search engine processors, wherein the activity website ID of the requested total activity record is identical to the affiliated website ID of the recordable activity record;

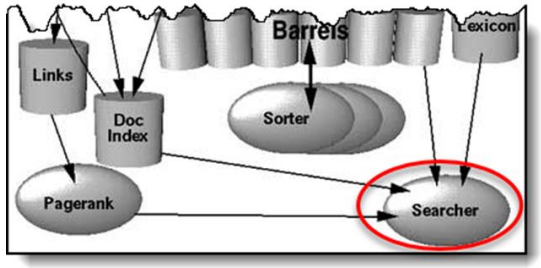
calculating a new total activity weight from the sum of the activity weight of the recordable activity record and the total activity weight of the requested total activity record by the one or more search engine processors; and

transmitting the new total activity weight from the one or more search engine processors to the second computer database.

4.5 Searching

The goal of searching is to provide quality search results efficiently. Many of the large commercial search engines seemed to have made great progress in terms of efficiency. Therefore, we have focused more on quality of search in our research, although we believe our solutions are scalable to commercial volumes with a bit more effort. The google query evaluation process is show in Figure 4.

1. Parse the query.
2. Convert words into



1. Parse the query.
2. Convert words into wordIDs.
3. Seek to the start of the doclist in the short barrel for every word.
4. Scan through the doclists until there is a document that matches all the search terms.
5. Compute the rank of that document for the query.
6. If we are in the short barrels and at the end of any doclist, seek to the start of the doclist in the full barrel for every word and go to step 4.
7. If we are not at the end of any doclist go to step 4.

Sort the documents that have matched by rank and return the top k.

Figure 4. Google Query Evaluation

Commentary: The Searcher process computes the rank/weight of the documents and returns the documents in sorted order by rank/weight.

Source:
http://infolab.stanford.edu/~backrub/google.html (4/2/2023)

REPRESENTATIVE CLAIM 5

5. The method of claim **4**, wherein the website activity of each of the one or more recordable activity records is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;

the website promoter publishing a tracked promoter hyperlink on a promoted webpage, the tracked promoter hyperlink being enabled to transmit a tracked request for webpage content to the tracked website;

the website promoter making a tracked relationship with another person through a tracked online social networking platform;

the website promoter removing the tracked relationship;

the website promoter sending a tracked message through the tracked online social networking platform;

the website promoter registering a domain name on a tracked domain name registry;

the website promoter creating a tracked account with the tracked website; and

the website promoter uploading tracked content to the tracked website.

CLAIM 5 (PART 1)

The system of claim 4, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

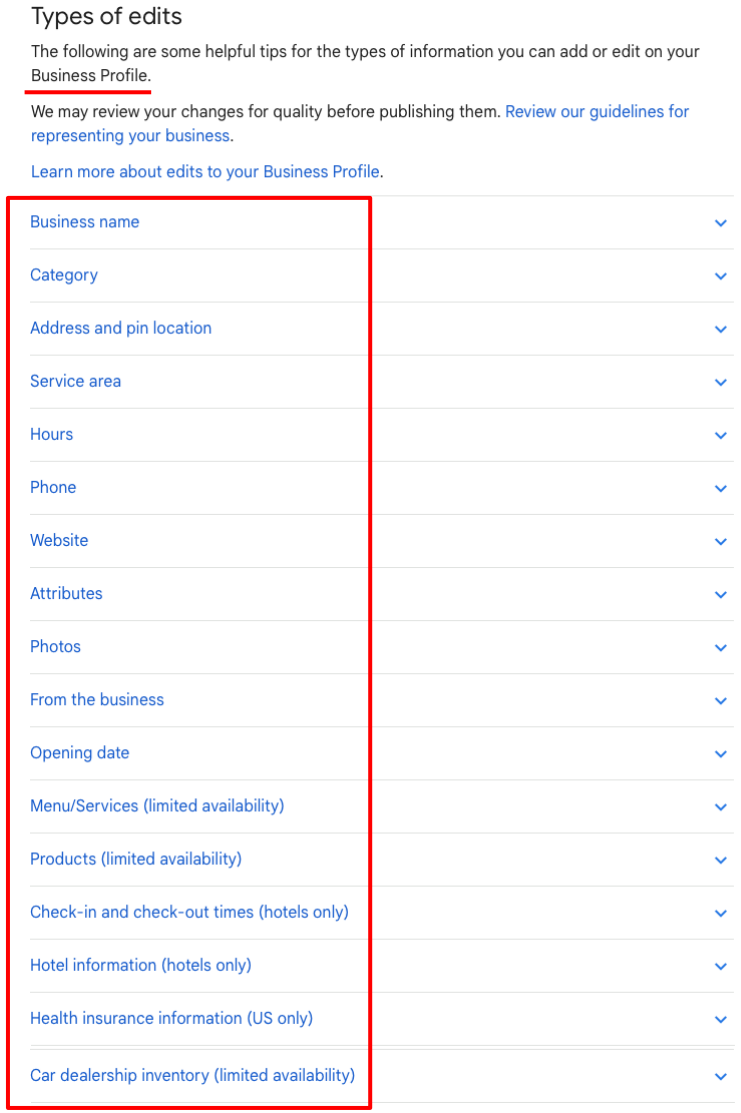
the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;



Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: Google search ties together what it can about a given website when it combines additional information given to it by business owners (authoritative sources).

For example, a given "Business Profile" with a website which Google has crawled, combined with a Google Ads account, and Google registered users (e.g. promoter ID), and other website activity such as providing hours of operation, photos, phone #, responding to reviews, etc. influence how Google ultimately ranks such a business in the search results.

CLAIM 5 (PART 1)

The method of claim 4, wherein the website activity of each of the one or more recordable activity records is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

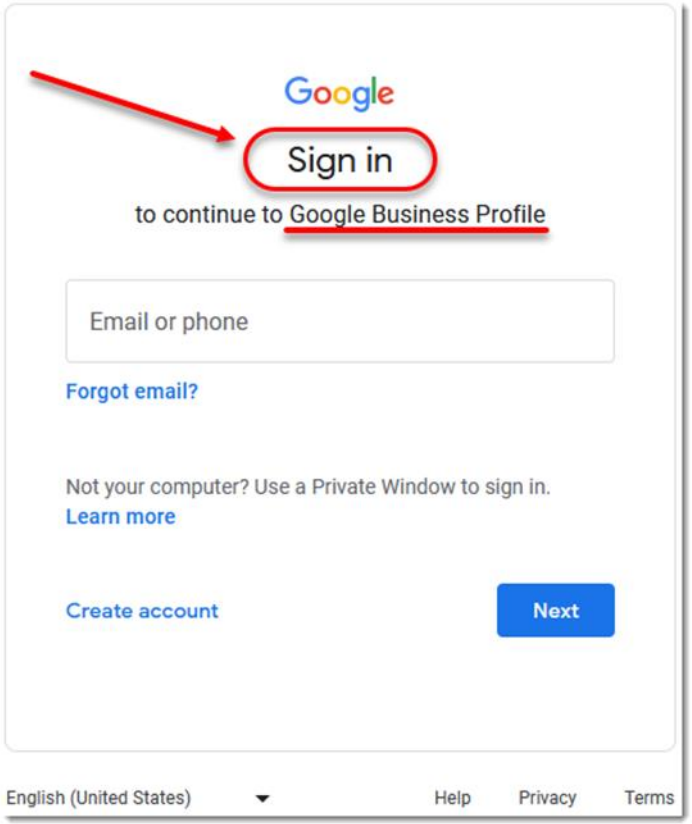
the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;



Source:
https://accounts.google.com/InteractiveLogin (4/9/2023)

Commentary: As defined throughout the patent, "*transmitting a request for **one or more recordable activity records** from the one or more search engine processor to a third computer database*" only one activity is required to satisfy Claim 5.

Although, there is sufficient evidence that suggests activity within the Business Profile influences rankings in the search results, one activity that Google clearly discloses that influences Google's rankings is the activity of logging into the promoter's Google account; which is a tracked website.

CLAIM 5 (PART 1)

The system of claim 4, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;

Verify for the first time

1. Add or claim your Business Profile on Google. Learn how to claim your profile.
2. When you add or claim your profile, you can verify it through phone, text, email, or video.
   - You may need to verify with more than one method.
   - Available methods depend on things like business category, public info, region, support hours, and volumes.
3. Pick a type of verification. Learn how to verify by your selected method.
4. Often, we need to review verifications. These reviews help maintain the integrity of all profiles. They can take up to seven business days.
   - When you're verified, you get a notification.
   - If we can't verify your business with the first method, the "Get verified" button shows up again. If this happens, try a different verification method.
5. After you verify:
   - It can take a few weeks for your updated business info to show across Google.
   - You can update and add to your info at any time. Learn how to edit your profile.
   - You can connect with your customers through your profile. Learn about posts, reviews, and messaging.

Source:
https://support.google.com/business/answer/7107242?hl=en&ref_topic=4854193 (2/10/2023)

Commentary: Google requires its claimers (promoters) to verify their businesses using multiple methods - email is one of the methods it supports.

The patent describes a pretty standard method of sending an email to verifier which includes a link back to Google that can be used to verify the user verifying has access to that email account.

Once verified, the promoter can start entering in personal and business profile information.

CLAIM 5 (PART 1)

The system of claim 4, wherein the website activity of each activity record is selected from the group consisting of:

the website promoter logging into a tracked website;

the website promoter opening a tracked email;

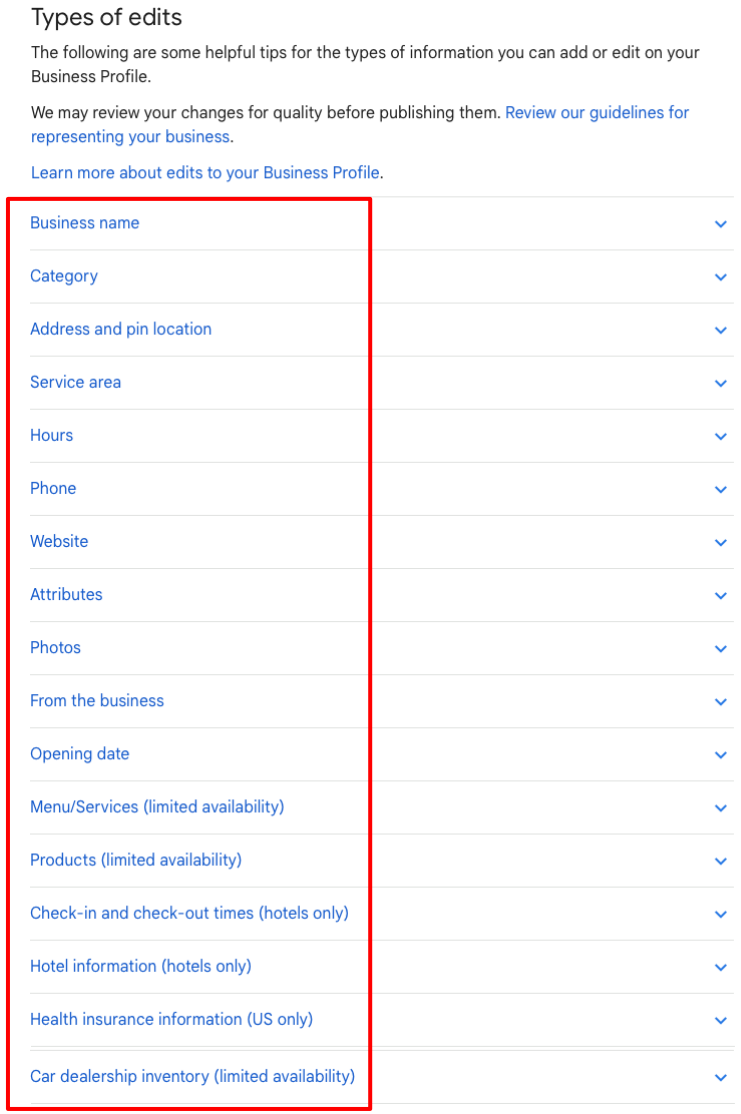
the website promoter clicking on a tracked email hyperlink in the tracked email;

the website promoter clicking on a tracked website hyperlink on the webpage content transmitted by the tracked website;

the website promoter uploading personal information to the tracked website;

the website promoter submitting a tracked search query to the tracked website;

the website promoter uploading a review of an affiliated website to the tracked website;



Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: Once verified, the promoter can start entering in personal and business profile information.

CLAIM 5 (PART 2)

the website promoter publishing a tracked promoter hyperlink on a promoted webpage, the tracked promoter hyperlink being enabled to transmit a tracked request for webpage content to the tracked website;

the website promoter making a tracked relationship with another person through a tracked online social networking platform;

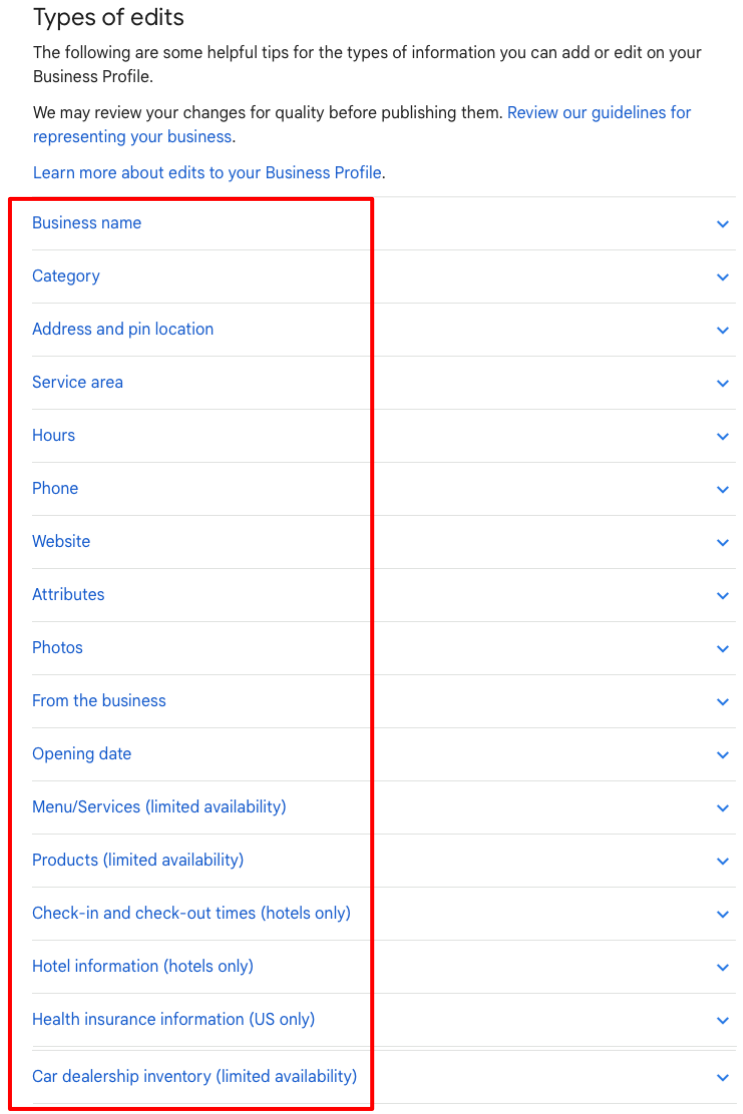
the website promoter removing the tracked relationship;

the website promoter sending a tracked message through the tracked online social networking platform;

the website promoter registering a domain name on a tracked domain name registry;

the website promoter creating a tracked account with the tracked website; and

the website promoter uploading tracked content to the tracked website.



Types of edits

The following are some helpful tips for the types of information you can add or edit on your Business Profile.

We may review your changes for quality before publishing them. Review our guidelines for representing your business.

Learn more about edits to your Business Profile.

- Business name
- Category
- Address and pin location
- Service area
- Hours
- Phone
- Website
- Attributes
- Photos
- From the business
- Opening date
- Menu/Services (limited availability)
- Products (limited availability)
- Check-in and check-out times (hotels only)
- Hotel information (hotels only)
- Health insurance information (US only)
- Car dealership inventory (limited availability)

Source:
https://support.google.com/business/answer/3039617 (10/2/2022)

Commentary: The types of information the promoter can enter about a given business depends on the type of business.

One or more promoters may be affiliated with one or more businesses as people can own more than one business and/or hire promoter(s) to oversee digital aspects of their business(s).

CONCLUSION

- All of the claims of U.S. Patent No. 8,849,807 are inferentially mapped to Google's search engine.

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