

Question Answering at Bing

Yan Ke

Principal Software Engineering Manager
Entity Understanding Group

Microsoft Research
Faculty Summit
2015
July 8-9, 2015



Search in the 1990's – 10 blue links



weather



Web

Images

Videos

Maps

News

Explore

The Weather Channel - Official Site

www.weather.com · Official site

The Weather Channel and **weather.com** provide a national and local **weather** forecast for cities, as well as **weather** radar, report and hurricane coverage.

AccuWeather - Official Site

www.accuweather.com ▾

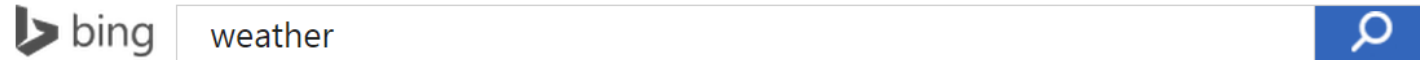
Weather forecast, local to international. World class **weather** radar plus your up to the minute **weather** report and current conditions

Weather Underground - Official Site

www.wunderground.com ▾

Weather Underground provides local & long range **Weather** Forecast, **weather** reports, maps & tropical **weather** conditions for locations worldwide.

Search in the 2000's – Instant answers




Web Images Videos Maps News Explore








347,000,000 RESULTS Any time  Near Redmond, WA · [Change](#)

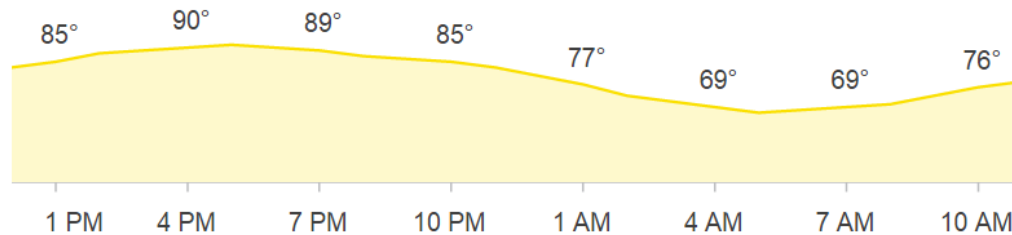
ALERT - Heat - Advisory

Redmond, Washington 98052



July 5, 10:00 AM

 **80** °F °C **Sunny**
Wind 1 MPH · Feels like 80° · Humidity 41%


Sun 5	Mon 6	Tue 7	Wed 8	Thu 9	Fri 10	Sat 11
						
91° 67°	93° 65°	90° 66°	92° 67°	90° 63°	86° 61°	82° 61°



Search today – Natural language understanding


 








Web Images Videos Maps News Explore

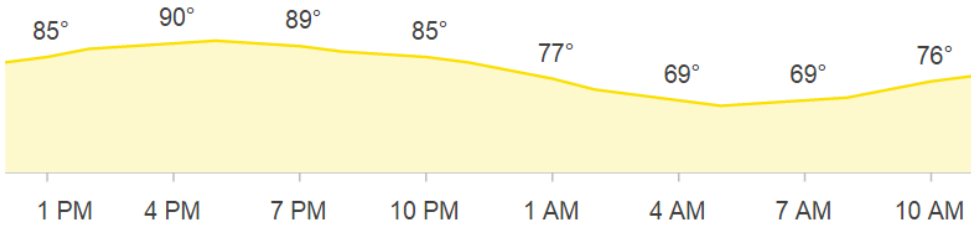
5,050,000 RESULTS Any time  Near Redmond, WA · [Change](#)

ALERT - Heat - Advisory

Redmond, Washington 98052
July 5, 10:00 AM

 **80** °F **Sunny**
Wind 1 MPH · Feels like 80° · Humidity 41%

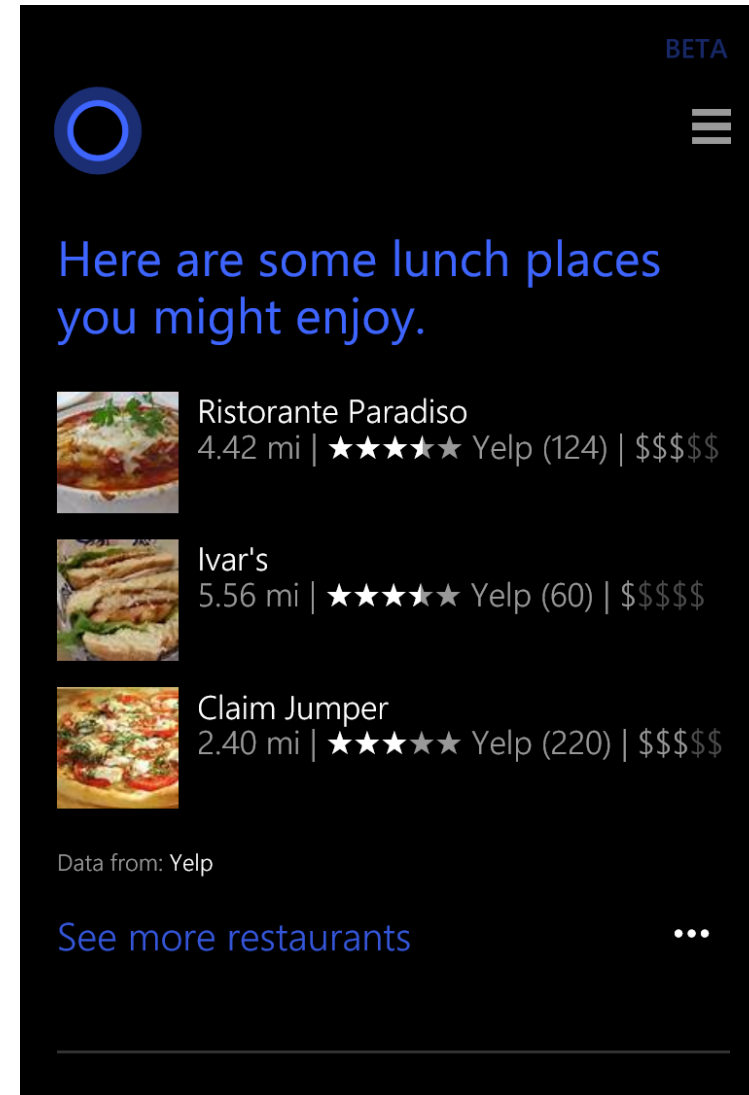
Sun 5	Mon 6	Tue 7	Wed 8	Thu 9	Fri 10	Sat 11
						
91° 67°	93° 65°	90° 66°	92° 67°	90° 63°	86° 61°	82° 61°


85° 90° 89° 85° 77° 69° 69° 76°
1 PM 4 PM 7 PM 10 PM 1 AM 4 AM 7 AM 10 AM

Proactive – Search via context



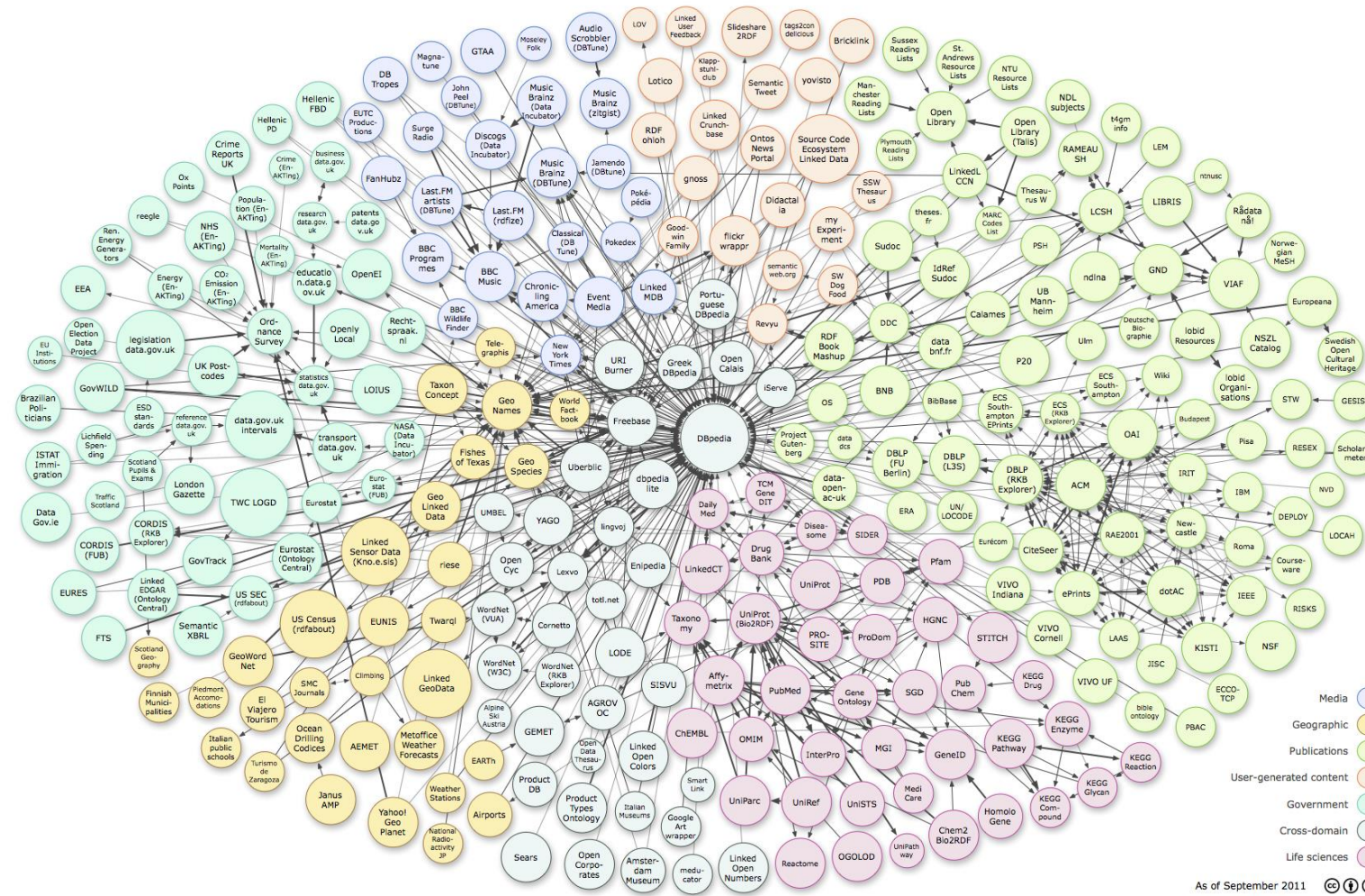
Proactive – Search via context



Reduce time to task completion

- 10 blue links
 - Relevant web pages
 - Page load times
- Instant answers from
 - Feed providers
 - Knowledge graph
 - Web free text
- Proactive
 - Answer before you even asked

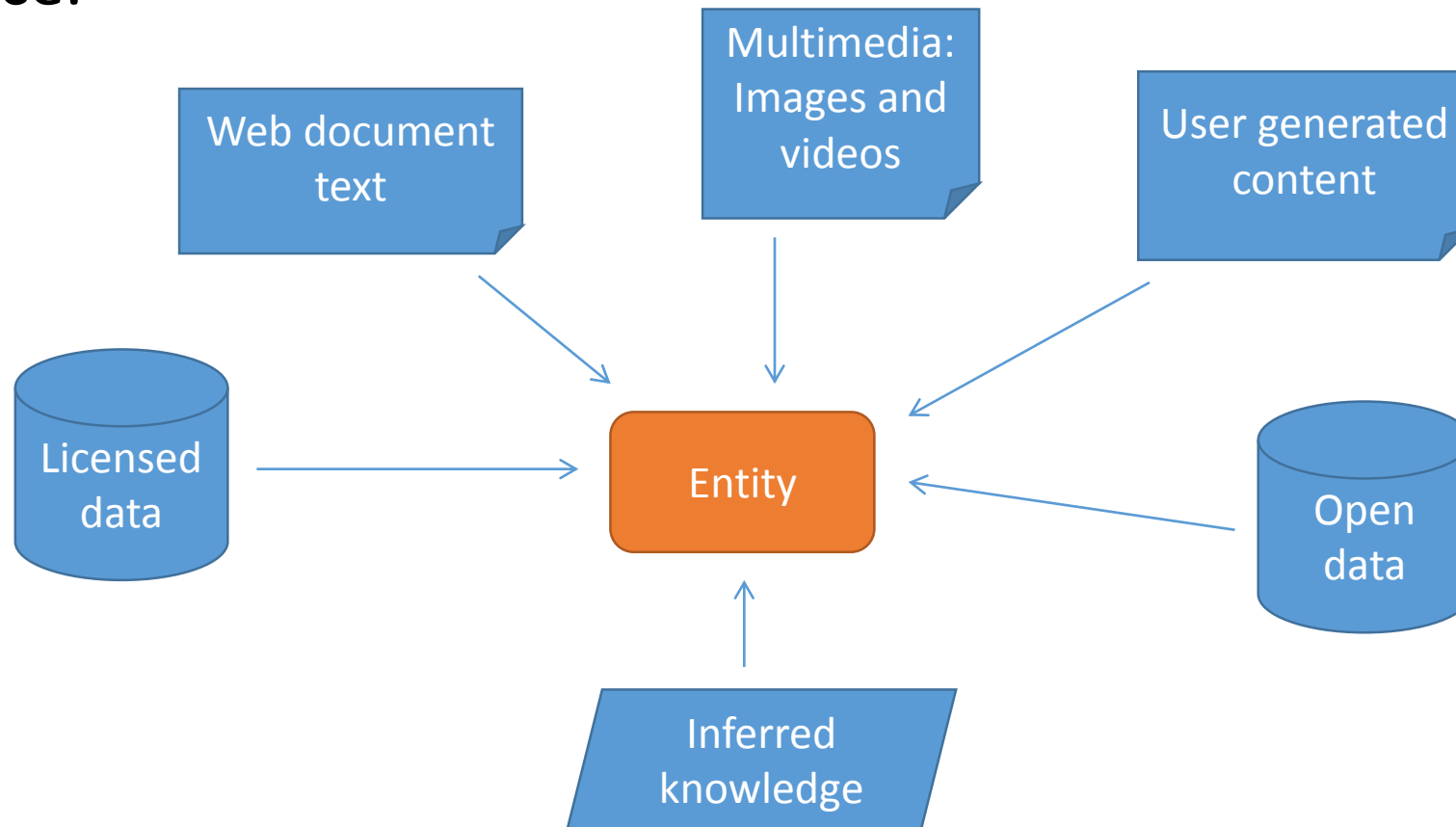
Question answering through knowledge graphs



As of September 2011   

Integrated entity experiences

Combine data from many sources for an entity to build a rich user experience.





U2 / Top songs / With or Without You



Top songs

With or Without You	4:49	Vertigo	3:14	New Year's Day	5:35	All I Want Is You	9:51	Walk On	4:56
I Still Haven't Found What I...	4:29	One	4:36	Stuck in a Moment You Can'...	3:41	Bullet the Blue Sky	4:32	Sometimes You Can't Make I...	5:08
Beautiful Day	4:07	Sunday Bloody Sunday	4:39	Mysterious Ways	4:03	Desire	2:59	In God's Country	2:57
Where the Streets Have No N...	4:35	Pride (In the Name of Love)	3:50	Elevation	3:47	City of Blinding Lights	5:20	Running to Stand Still	4:17

Songs of Innocence
2014Videos of **u2 with or without you**bing.com/videos[See more songs by U2](#)

Lyrics

See the stone set in your eyes
 See the thorn twist in your side
 I wait for you
 Sleight of hand and twist of fate
 On a bed of nails she makes me wait
 And I wait, without you

With or without you
 With or without you

Through the storm we reach the shore
 You give it all but I want more
 And I'm waiting for you

[VIDEO] **U2 - With Or Without You - YouTube**www.youtube.com/watch?v=XmSdT9kaiQ

By U2VEVO · 5 min · 105,897,210 views · Added Oct 05, 2009

Music video by **U2** performing **With Or Without You**. 1987 Universal-Island Records Ltd. under exclusive licence to Mercury Records Limited[The Police](#) · [Try Something New](#) · [Google Play](#) · [Hoobastank](#) · [Sinéad O'Connor](#)

With or Without You



"With or Without You" is a song by the Irish rock band U2. It is the third track from their fifth studio album, The Joshua Tree, and was released as the album's lead single on 21 March 1987. The song was the group's most successful single at th... +

U2 - With Or Without You

4:51

YouTube · 104,687,000+ views

[See more songs by U2](#)

[VIDEO] [U2 - With Or Without You - YouTube](#)

www.youtube.com/watch?v=XmSdT9kaiQ

By U2VEVO · 5 min · 104,667,422 views · Added Oct 05, 2009

Music video by **U2** performing **With Or Without You**. 1987 Universal-Island Records Ltd. under exclusive licence to Mercury Records Limited

[With or Without You - Wikipedia](#), the free encyclopedia

en.wikipedia.org/wiki/With_or_Without_You

"**With or Without You**" is a song by the Irish rock band **U2**. It is the third track from their fifth studio album, **The Joshua Tree** (1987), and was released as the album ...

[Writing and recording](#) · [Composition](#) · [Release and chart ...](#) · [Live performances](#)

[With Or Without You Lyrics - U2 - LyricsFreak.com](#)

www.lyricsfreak.com · [U2](#)

Lyrics to **With Or Without** by **U2**: See the stone set in your eyes / See the thorn twist in your side / I'll wait for **you** / Sleight of hand

[U2 - With Or Without You Lyrics | MetroLyrics](#)

www.metrolyrics.com/with-or-without-you-lyrics-u2.html

"**With Or Without You**" is track #4 on the album U218 Singles. It was written by Adam Clayton, Dave Evans, Paul Hewson, Larry Mullen. (No other information is available ...)

Related searches for **u2 with or without you**

[U2 All I Want Is You](#)

[With or Without You Lyrics](#)

[U2 Greatest Hits](#)

[U2 Sunday Bloody Sunday](#)

[With or Without You U2 YouTube](#)

[With or Without You Song](#)

[U2 - With or Without You Lyrics | SongMeanings](#)

songmeanings.com · [Artists - U](#)

You give it all but I want more

And I'm waiting for you

With or Without You



"With or Without You" is a song by the Irish rock band U2. It is the third track from their fifth studio album, *The Joshua Tree*, and was released as the album's lead single on 21 March 1987. The song was the group's most successful single at th... +

en.wikipedia.org

Album: *The Joshua Tree*

Artist: U2

Duration: 4:49

Genre: Rock, Mainstream Rock

Listen or buy

Xbox Music

iTunes

Amazon MP3

Also appears on



U218
Singles



The Best Of
1980 - 1990

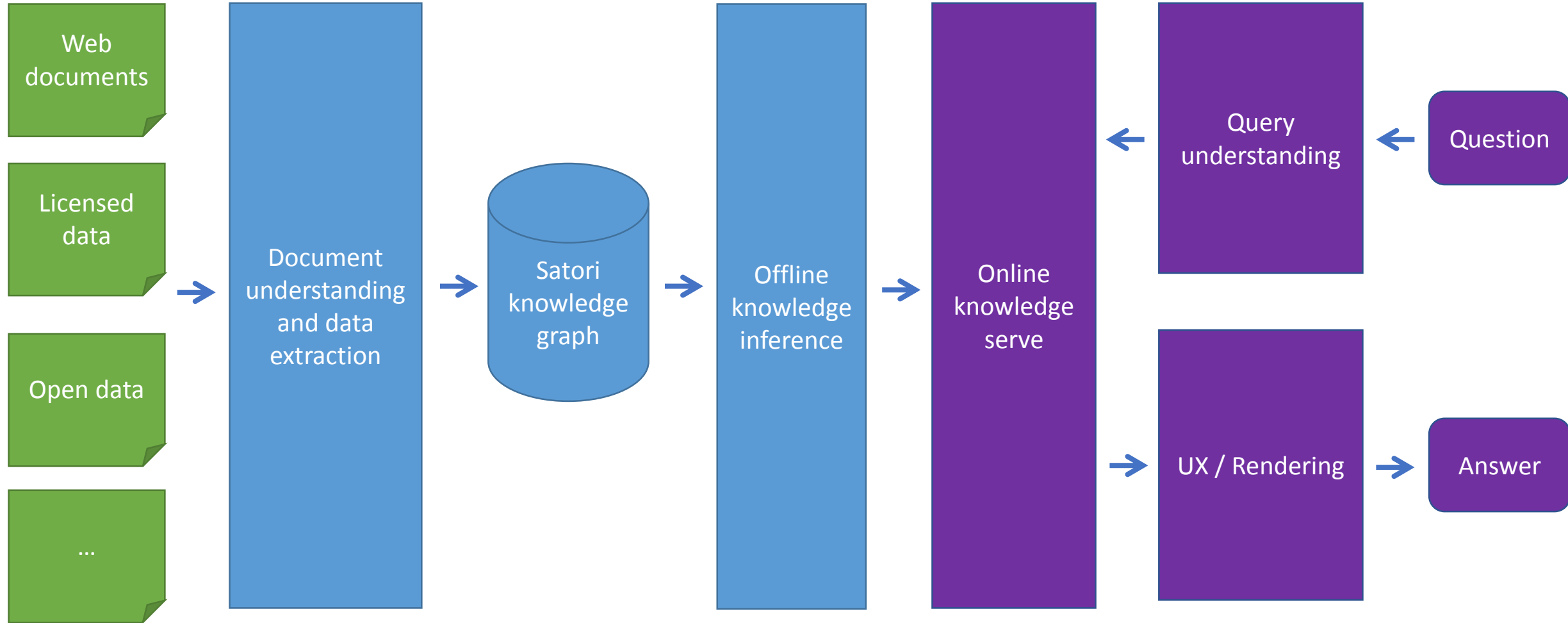


Please

Data from: [Xbox Music](#) · [LyricFind](#) · [Freebase](#)

[Feedback](#)

High level architecture



Advanced query understanding demo



tom hanks movies



Web

Images

Videos

Maps

News

Explore

Tom Hanks

Movies

All genres

All years

Popular first



Captain Phillips
(2013)



Saving Mr.
Banks (2013)



Forrest Gump
(1994)



A Hologram for
the King (2015)



Cast Away
(2000)



Bridge of Spies
(2015)



Inferno (2016)



tom hanks movies with meg ryan

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7,030,000 RESULTS

Any time ▾

Movies

starring

Meg Ryan

featuring

Tom Hanks

Sleepless in Seattle
(1993)



You've Got Mail (1998)



Joe Versus the Volcano
(1990)





tom hanks first movie with meg ryan

Web

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Explore

2,720,000 RESULTS

Any time ▾

Movie

starring

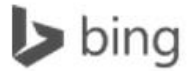
Meg Ryan

featuring

Tom Hanks

Joe Versus the Volcano
(1990)





director of tom hanks first movie with meg ryan

Web

Images

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Explore

1,700,000 RESULTS

Any time ▾

Director of

Joe Versus the Volcano

which stars

Meg Ryan

featuring

Tom Hanks

John Patrick Shanley



IMDb: **Sleepless in Seattle** (1993)

www.imdb.com/title/tt0108160 ▾

★ ★ ★ ★ ☆ Rating: 6.8/10 · 111,648 ratings · Comedy/Drama/Romance · PG · 105 min

With **Tom Hanks**, **Meg Ryan**, ... **Director:** Nora Ephron. **Writers:** Jeff Arch (story), ... **Title:** **Sleepless in Seattle** (1993) ...

Collaborations - **Tom Hanks** Online

www.tomhanks-online.com/career/collaborations/2 ▾


Tom Hanks and **Meg Ryan** are well known ... **Tom Hanks** in Big in 1988, a **movie** for which he ... Angel that marked **Tom Hanks's** first project as a **director**.

“Answer what I wanted to know, not what I asked.”


bing jurassic park release date

Web Images Videos Maps News Explore 1 Sign in

2,670,000 RESULTS Any time



Jun 12, 2015
Jurassic World · Release date



Watch Trailer

Showtimes for Jurassic World

	Today	Tomorrow	Wed, Jul 8		
Regal Bella Bottega Stadium 11 - map					
STANDARD	1:20 PM	4:35	7:35	9:15	
3D	11:10 AM	12:30 PM	3:30	6:40	10:10
iPic Theaters at Redmond Town Center - map					
STANDARD	9:40 AM	12:40 PM	3:40	6:35	9:35
Kirkland Parkplace Cinema 6 - map					
STANDARD	1:00 PM	4:00	7:00	9:30	

Jurassic World

PG-13 · 2015 · 2hr 4min · Action

IMDb 7.4/10 ★★★★★
Rotten Tomatoes 71% ★★★★★

A new theme park is built on the original site of Jurassic Park. Everything is going well until the park's newest attraction--a genetically modified giant stealth killing machine--escapes contain... +

Director: [Colin Trevorrow](#)

Estimated budget: \$150 million USD

Screenwriters: [Colin Trevorrow](#) · [Michael Crichton](#) · [Derek Connolly](#) · [Rick Jaffa](#) · [Amanda Silver](#)

Production companies: [Legendary Pictures](#) · [Amblin Entertainment](#)

Music by: [John Williams](#) · [Michael Giacchino](#)

Story by: [Rick Jaffa](#) · [Amanda Silver](#)



tallest buildings in the world



Web

Images

Videos

Maps

News

Explore

1

Highest Buildings



Burj Khalifa
2,717 feet



Tokyo Skytree
2,080 feet



Shanghai Tower
2,073 feet



102 Incheon Tower
1,969 feet



Canton Tower
1,969 feet



Goldin Finance 117
1,959 feet



Ping An Finance Centre
1,821 feet

Closed world assumption



Web Images Videos Maps News Explore

1 

Highest Buildings



Burj Khalifa
2,717 feet



Tokyo Skytree
2,080 feet



Shanghai Tower
2,073 feet



102 Incheon Tower
1,969 feet



Canton Tower
1,969 feet



Goldin Finance 117
1,959 feet



Ping An Finance Centre
1,821 feet

first, tallest, longest, largest, smallest, deepest, fastest, ...

Q&A from web text

Web text
(10 blue links)

Web text
(10 blue links)



Feeds
(weather,
stock, etc.)

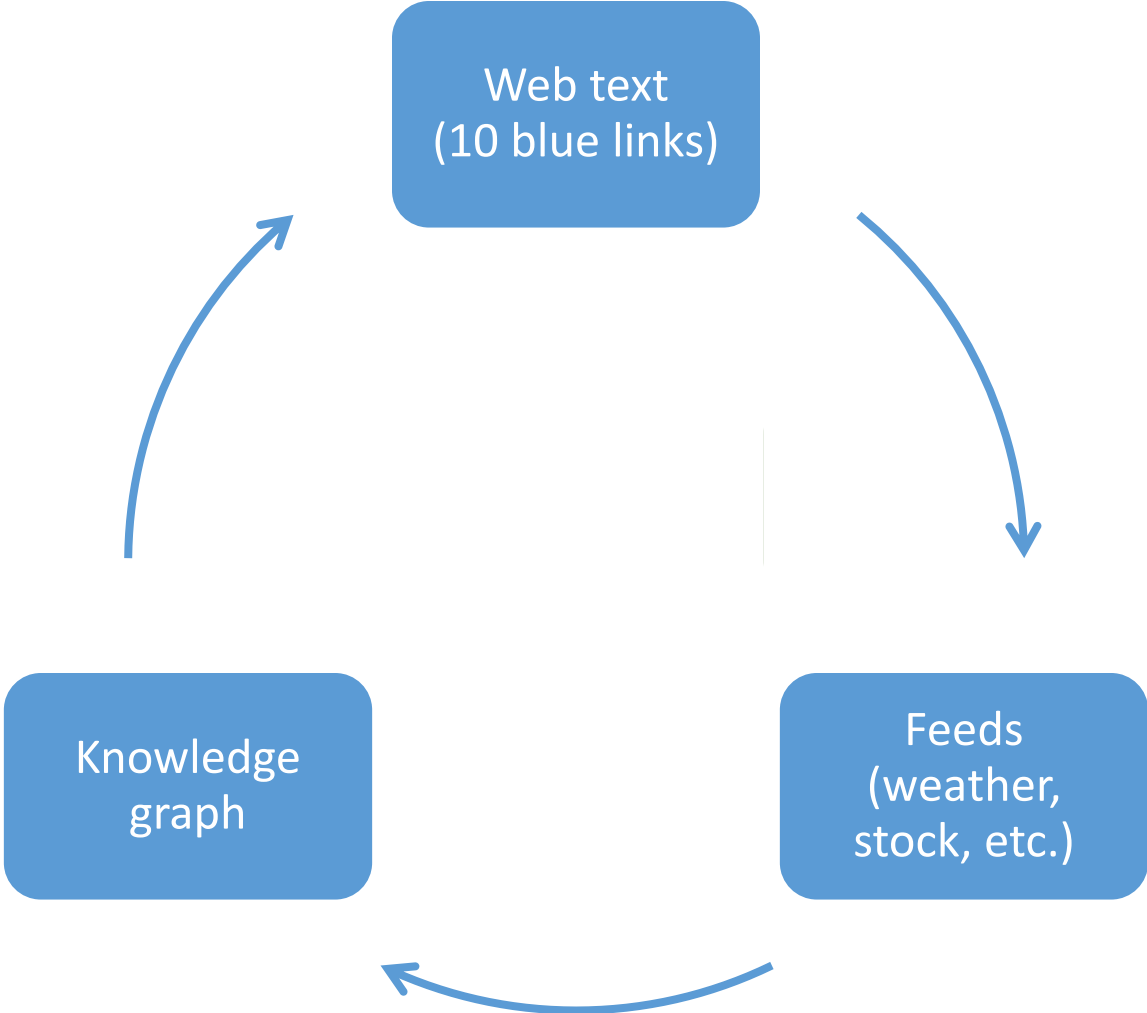
Web text
(10 blue links)

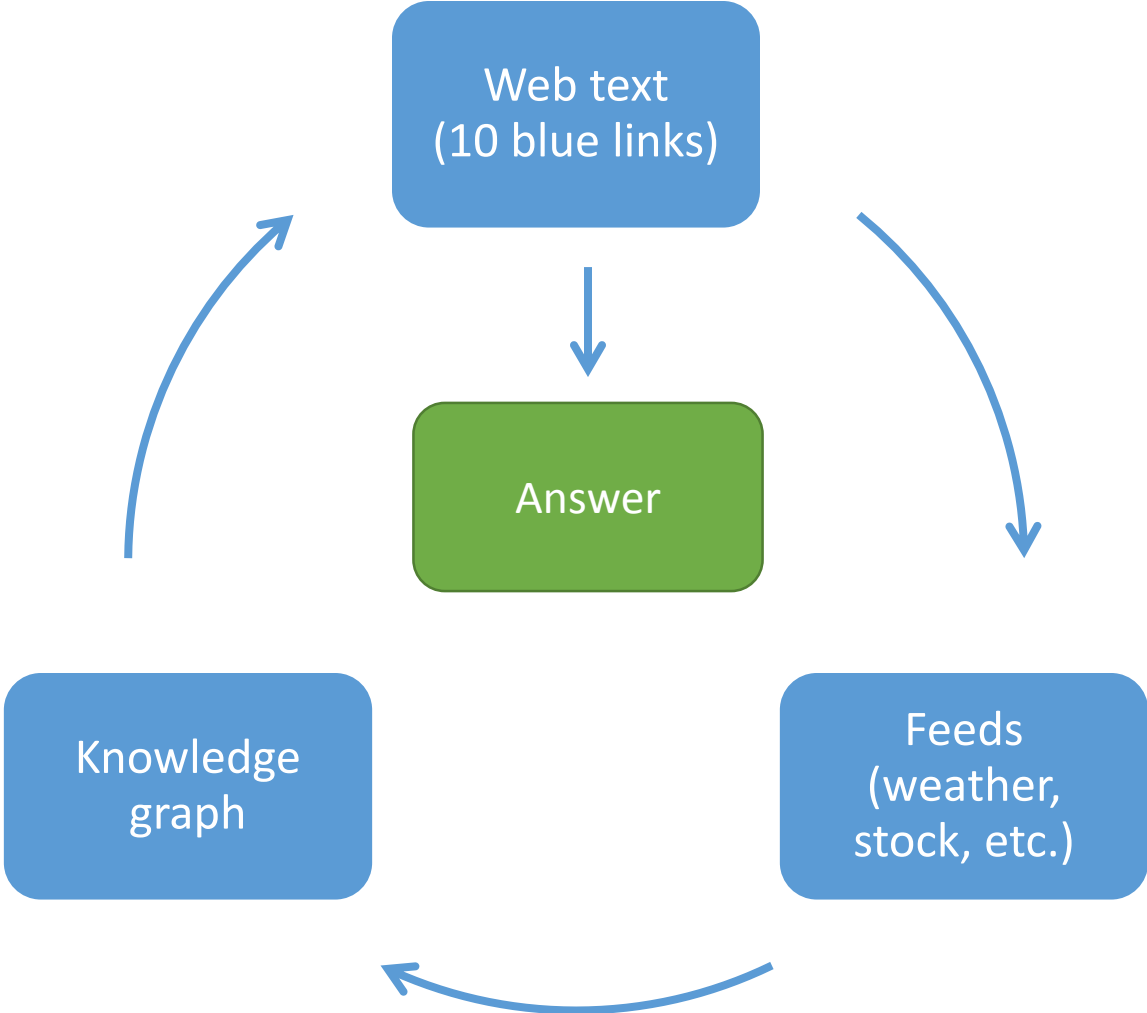


Feeds
(weather,
stock, etc.)

Knowledge
graph









who is the first man on the moon

Web

Images

Videos

Maps

News

Explore

15,400,000 RESULTS

Any time ▾

Neil Alden Armstrong (born August 5, 1930) is an American aviator and a former astronaut, test pilot, aerospace engineer, university professor, and United States Naval Aviator. He was the first person to set foot on the Moon.

[Neil Armstrong: First Man on the Moon P1 - YouTube](#)

www.youtube.com/watch

Feedback



how to clean dishwasher

Web

Images

Videos

Maps

News

Explore

84,200,000 RESULTS

Any time ▾

How to Clean Your Dishwasher

- Dip a small brush, say, an old toothbrush.
- A soft abrasive cleanser such as Bon Ami may be needed to remove dried and baked on grime.
- Dip a cellulose sponge in the hot soapy water and wipe off the gunk you loosened with the brush and cleanser on the door.
- Using a clean wet sponge or cleaning rag, wipe down the the gasket and the door.

[See more](#) ▾

[How to Clean a Dishwasher | Kitchen Appliances and ...](#)

howtocleanstuff.net/how-to-clean-dishwashers

Feedback



apple watch price

Web

Images

Videos

Maps

News

Explore

7,370,000 RESULTS

Any time ▾

Apple Watch introductory price

Watch Sport

38 mm: US\$349

42 mm: US\$399

Watch

38 mm: US\$549–US\$1,049

42 mm: US\$599–US\$1,099

Watch Edition

38 mm & 42 mm: US\$10,000–US\$17,000

[Apple Watch - Wikipedia, the free encyclopedia](#)

en.wikipedia.org/wiki/Apple_Watch

Feedback



what is malware

Web

Images

Videos

Maps

News

Explore

12,600,000 RESULTS

Any time ▾

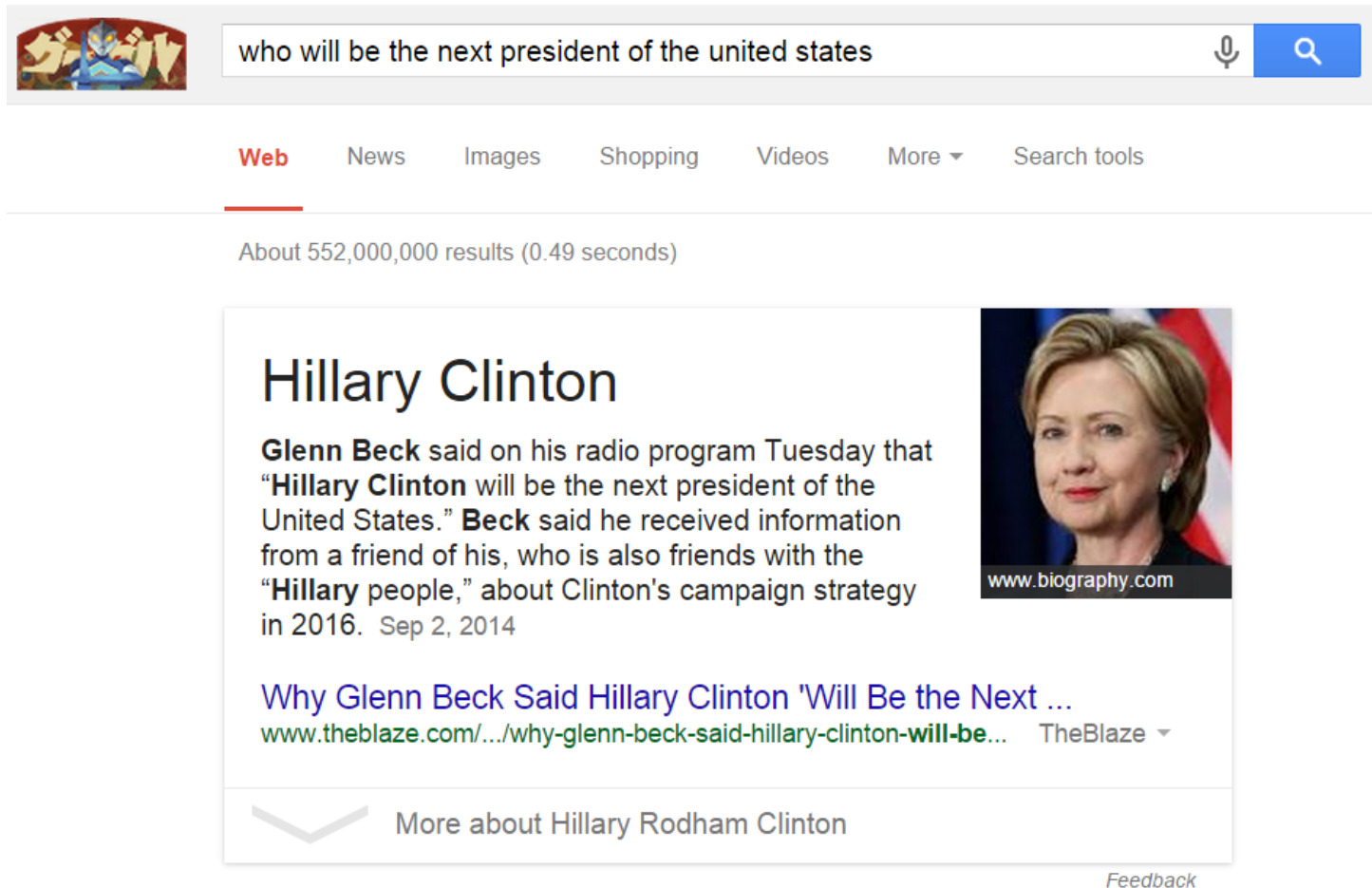
Malware, short for malicious software, is any software used to disrupt computer operation, gather sensitive information, or gain access to private computer systems. **Malware** is defined by its malicious intent, acting against the requirements of the computer user, and does not include software that causes unintentional harm due to some deficiency.

[Malware - Wikipedia, the free encyclopedia](#)

en.wikipedia.org/wiki/Malware

Feedback

High user expectations => High precision requirements



The image shows a Google search interface. At the top, there is a search bar with the text "who will be the next president of the united states" and a search button. Below the search bar, there are navigation tabs for "Web", "News", "Images", "Shopping", "Videos", "More", and "Search tools". The "Web" tab is selected. Below the tabs, it says "About 552,000,000 results (0.49 seconds)". The main result is a Knowledge Panel for "Hillary Clinton". The panel includes a portrait of Hillary Clinton, a short paragraph of text, and a link to a news article. The text in the panel reads: "Glenn Beck said on his radio program Tuesday that 'Hillary Clinton will be the next president of the United States.' Beck said he received information from a friend of his, who is also friends with the 'Hillary people,' about Clinton's campaign strategy in 2016. Sep 2, 2014". The link is "Why Glenn Beck Said Hillary Clinton 'Will Be the Next ..." with the URL "www.theblaze.com/.../why-glenn-beck-said-hillary-clinton-will-be..." and the source "TheBlaze". At the bottom of the panel, there is a "More about Hillary Rodham Clinton" link. A "Feedback" link is visible at the bottom right of the panel.

who will be the next president of the united states

Web News Images Shopping Videos More Search tools

About 552,000,000 results (0.49 seconds)

Hillary Clinton

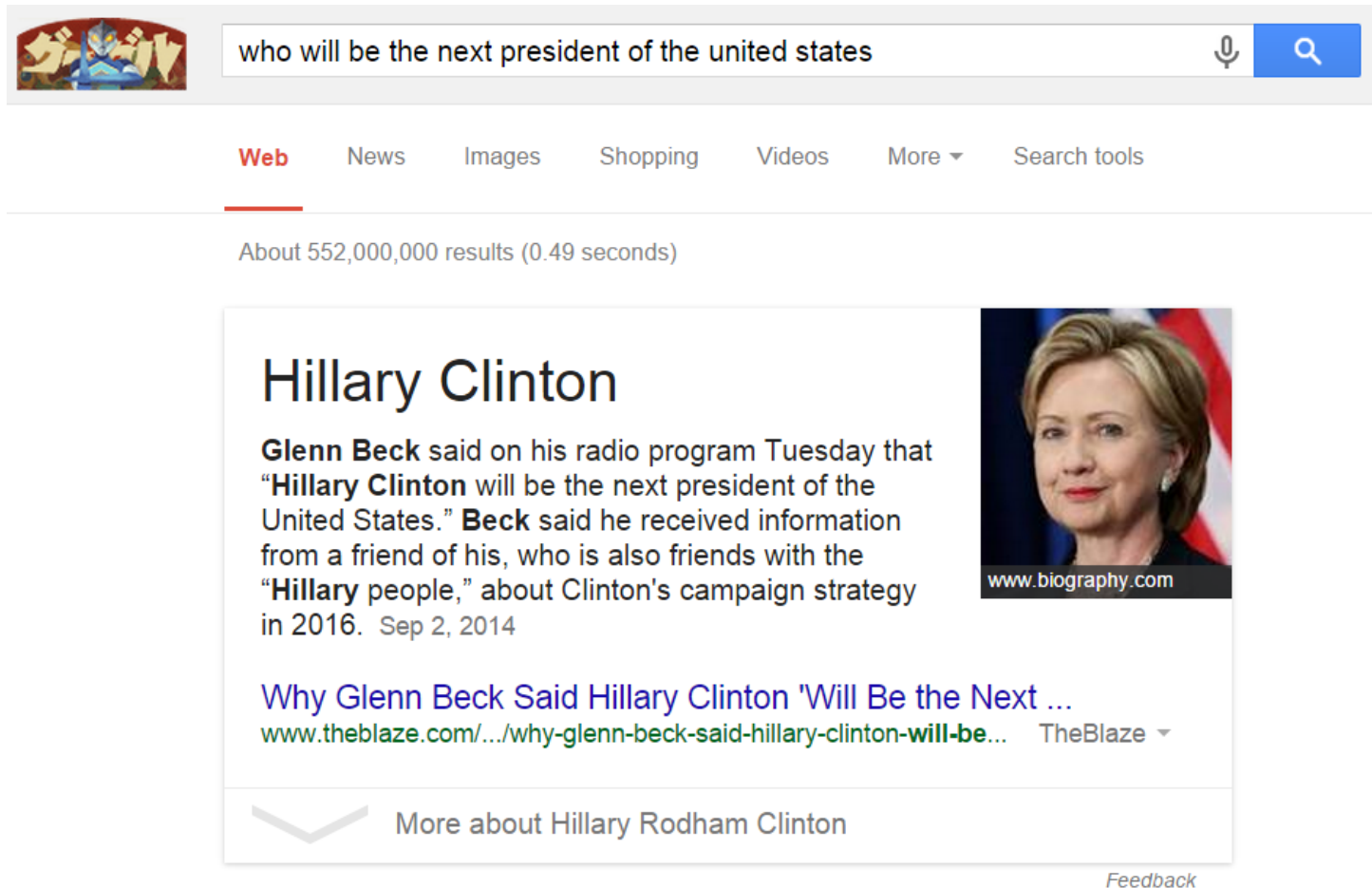
Glenn Beck said on his radio program Tuesday that "Hillary Clinton will be the next president of the United States." Beck said he received information from a friend of his, who is also friends with the "Hillary people," about Clinton's campaign strategy in 2016. Sep 2, 2014

Why Glenn Beck Said Hillary Clinton 'Will Be the Next ...
www.theblaze.com/.../why-glenn-beck-said-hillary-clinton-will-be... TheBlaze

More about Hillary Rodham Clinton

Feedback

High user expectations => High precision requirements




who will be the next president of the united states

Web News Images Shopping Videos More Search tools

About 552,000,000 results (0.49 seconds)

Hillary Clinton

Glenn Beck said on his radio program Tuesday that "Hillary Clinton will be the next president of the United States." Beck said he received information from a friend of his, who is also friends with the "Hillary people," about Clinton's campaign strategy in 2016. Sep 2, 2014



www.biography.com

[Why Glenn Beck Said Hillary Clinton 'Will Be the Next ...](http://www.theblaze.com/.../why-glenn-beck-said-hillary-clinton-will-be...)
www.theblaze.com/.../why-glenn-beck-said-hillary-clinton-will-be... TheBlaze

More about Hillary Rodham Clinton

Feedback

How to tell fact from:

rumors / gossip
predictions / speculation
opinion
myths / urban legends
controversy
bad science

???

Action Answers



48,600,000 RESULTS

Any time ▾

Read I, Robot



Buy on Barnes and Noble



Buy on Amazon



King County Library System

I, Robot by Isaac Asimov | 9780553382563 | Paperback ...www.barnesandnoble.com/w/i-robot-isaac-asimov/1100302412?ean=... ▾

★★★★★ Rating: 4/5 · 220 ratings · \$12.46

I, Robot, the first and most widely read book in Asimov's **Robot** series, is a collection of nine stories that forever changed the world's perception of artificial ...

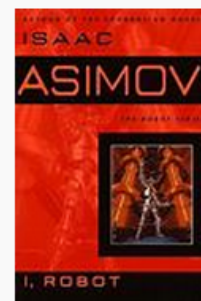
I, Robot (The **Robot** Series): Isaac Asimov: ...www.amazon.com > ... > Science Fiction > Short Stories ▾

★★★★★ Rating: 4.2/5 · 460 reviews · By Isaac Asimov · Mass Market Paperback

I, Robot (The **Robot** Series Book 1) and over one million other books are available for Amazon Kindle. Learn more

I, Robot

Robot

[Barnes and Noble](#)

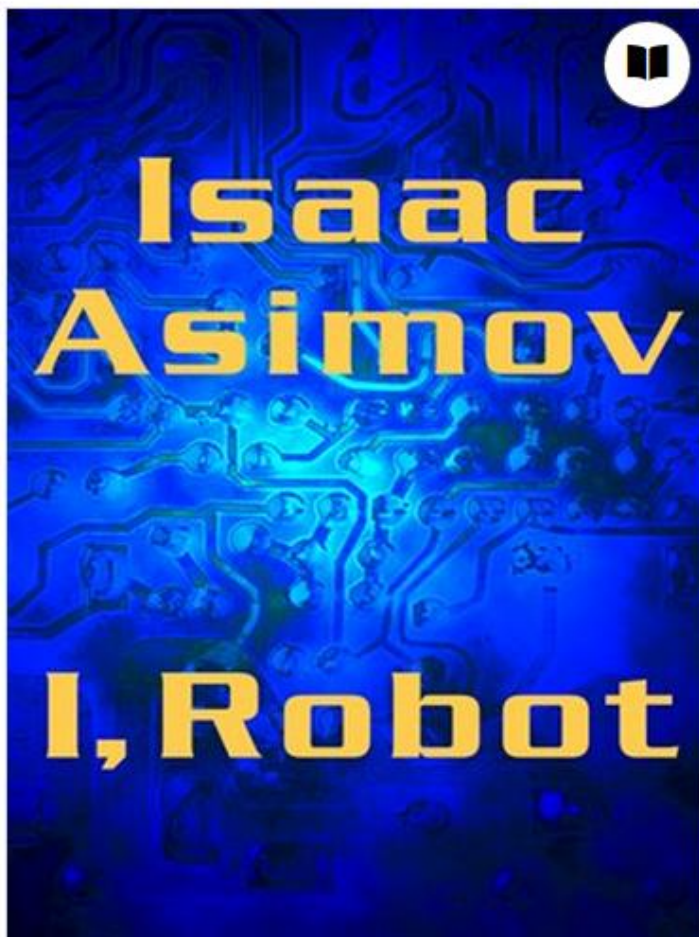
4.2/5 ★★★★★

[Amazon](#)

4.2/5 ★★★★★

I, Robot is a collection of nine science fiction short stories by Isaac Asimov. The stories originally appeared in the American magazines *Super Science Stories* and *Astounding Science Fiction* between... +


W [Wikipedia](#)**Author:** [Isaac Asimov](#)**First published:** Dec 02, 1950**Adaptations:** [I, Robot](#) (2004)**Series:** [Robot series](#)**Followed by:** [The Complete Robot](#)**Characters:** [Susan Calvin](#) · [Powell and Donovan](#) · [Lawrence Robertson](#) · [Dr. Alfred Lanning](#) · [Peter Bogert](#)



I, Robot

by Isaac Asimov

Borrow

 Add to Wish List



Sign in & rate this title.

In the late 1940s and early 1950s Isaac Asimov found a home on the pages of the science-fiction magazines *Astounding* and *Super-Science Stories*. World War II had just ended and the world was obsessed with air combat and the role of technology in society. Asimov's stories



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Netflix



Amazon



Xbox Video



Watch trailer on IMDb



2:44:24

▶ 🔊 Django Unchained





120,000,000 RESULTS

Any time ▾

Videos of **play stay with me**bing.com/videos[See more songs by Sam Smith](#)

Lyrics

Guess it's true, I'm not good at a one night stand
But I still need love 'cause I'm just a man
These nights never seem to go to plan
I don't want you to leave, will you hold my hand?

Oh, won't you stay with me?
'Cause you're all I need
This ain't love it's clear to see
But darling, stay with me

Why am I so emotional?
No it's not a good look, gain some self control
And deep down I know this never works

Conclusions

- Users **love** instant answers
- Users **hate** wrong answers
- **Speed** matters – optimize for time to task completion
- **Entities** allows us to connect knowledge and build rich experiences
- Working to extract answers directly from web content, correctly.

