

Microsoft® Research

Faculty Summit

10
YEAR ANNIVERSARY

Whither Search?

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Technical Fellow

Search Labs, Microsoft Research – Silicon Valley



Outline



- Current state of affair
- Evolving search
- Search labs projects

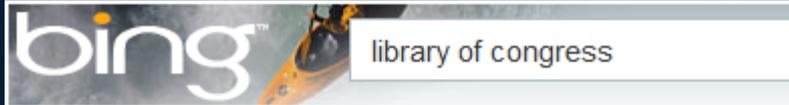
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Does Search Work?

👍 Navigational Queries



ALL RESULTS

Best match

[Library of Congress Home](#)

www.loc.gov/index.html

The **Library of Congress**. The **Library of Congress** is the nation's largest library, and it serves as the research arm of Congress. It

- Library Catalogs
- Digital Collections
- Researchers
- Visitors
- About the Library
- Kids, Families
- Jobs/Fellowships
- Teachers

Customer service 202-707-5000

[Images of library of congress](#)



[see more](#) · [large images](#) · [black & white](#)

[Library of Congress Online Catalog](#)

Online access to the collections resident at the **Library of C**

👍 Pseudo- Navigational



ALL RESULTS

[Images of daniel defoe](#)



[see more](#) · [large images](#) · [black & white](#)

[Daniel Defoe - Wikipedia, the free encyclopedia](#)

Daniel Defoe (c. 1659-1661 — 24 April 1731 [1]), born **D** journalist, and pamphleteer, who gained enduring fame for [Biography](#) · [Novels](#) · [Defoe and the Anglo ...](#) · [Works](#)
en.wikipedia.org/wiki/Daniel_Defoe · [Enhanced view](#)

[Daniel Defoe - Biography and Works](#)

Daniel Defoe. Biography of **Daniel Defoe** and a search at www.online-literature.com/defoe · [Cached page](#)

[Daniel Defoe](#)

Provides an in-depth look at the author's life and his impact at www.kirjasto.sci.fi/defoe.htm · [Cached page](#)

My Recent Searches

- Car GPS around \$300
- Four day trip to Bhutan from Delhi to visit important Buddhist places



Best Car GPS Around \$300

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Three Google search results are shown side-by-side. The first search is for 'best car gps bet', the second for 'best car gps around \$300', and the third for 'best car gps between \$275 and \$325'. The first result has a yellow speech bubble annotation that says 'Game Console' and a red circle around the text 'What to Know When Buying a GPS'. The second result has a yellow speech bubble annotation that says 'Party Site'. The third result has a yellow speech bubble annotation that says 'Party Site'.

A screenshot of the Amazon.com website. The search bar contains 'best car gps around \$300'. Below the search bar, a message reads: 'Your search "best car gps around \$300" did not match any products.' Below this, it says 'Showing results using some of your search terms'. A red oval highlights the text: '"best car gps around \$300" (See all 367 results)'. Below this, three search results are displayed:

1. **Hot Cars of the 60s: The Best Cars from Around the World (Flight Test Lab) (Sep 30, 2004) by Craig**. The image shows a book cover with a blue classic car. A yellow arrow points to the text 'LOOK INSIDE!'.
2. **Rock Around the Clock (Dec 17, 2007) by Joey Welz**. The image shows a CD cover for 'The Best Of JOEY WELZ' with 'RADIO SINGLES' and 'DECADES—50s/60s/70s'. The price is listed as 'Buy new: \$0.99'.
3. **Sound Around Pyramid MV104 Mount TFT LCD Video Monitor**. The image shows a car-mounted video monitor.

Bhutan From Delhi in 4 Days

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Google

Bhutan from delhi in four days

Search

[Advanced Search](#)
[Preferences](#)

[Web](#) › [Wonder wheel](#) [Hide options](#)

Results 1 - 10 of about 231,000 for [Bhutan from delhi in four days](#).

[Bhutan PM to visit India for four days](#)



[Bhutan PM to visit India for four days](#)

Bhutan PM to visit India for four days. Ani. June 29th, 2009. NEW DELHI - Bhutan's Prime Minister, Lyonchen Jigmi Y. Thinley, ... [blog.taragana.com/.../bhutan-pm-to-visit-india-for-four-days-94644/](#) - [Cached](#) - [Similar](#)

[Bhutan PM to visit India for four days](#)

Bhutan PM to visit India for four days - Bhutans Prime Minister, Lyonchen Jigmi Y. Thinley, will pay a **four-day** working visit to New **Delhi** from June 30 to ... [www.andhranews.net/India/.../29-Bhutan-visit-](#)

User Expectations

Web > **Forums** [Hide options](#) Results 1 - 10 of about 2,980 for [Bhutar](#)

[All results](#)
[Videos](#)

Any time
[Past 24 hours](#)
[Past week](#)
[Past year](#)

[Holiday destination From Delhi - Team-BHP](#)
10 posts - 7 authors - Last post: Dec 15, 2008
1) cannot extend beyond **4 days** weekend included. ... The only places I know of where you don't need a visa are Nepal and **Bhutan**. ...
www.team-bhp.com/.../50450-holiday-destination-delhi.html - [Cached](#) - [Similar](#)

[Delhi To Pune Non Stop In My Wagon R & Return Solo - Page 2 ...](#)
6 posts - 3 authors - Last post: Jan 30
1) I don't think in any case you gonna need **4 days** to reach **Delhi** from Mumbai (Panvel/Khopoli)it's only 1400 KM on 4 lane highway ...
www.indiamike.com/india/india-travel.../delhi.../2/ - [Cached](#) - [Similar](#)

Quote:

Originally Posted by **Kool_Kid** 

i wish to take my wife on a small weekend (since we have to postpone our honeymoon due to my new job)

- 1) cannot extend beyond 4 days weekend included.
- 2) place should not require visa (or visa on arrival)
- 3) start point and end point should be delhi
- 4) buget <= 1 lakh

pls suggest

Since you mention visas, I suppose you are looking at a foreign trip? The only places I know of where you don't need a visa are Nepal and Bhutan. I am sure there are flights directly to Kathmandu from Delhi. For Bhutan, you can go via Kolkata. Not sure of there is anything from Delhi.

Observations

- Search queries are not grammatically correct questions, but they are not bags of words either
- Query terms are often more than strings of characters
- Data often has structure or structure can be derived
- Search can span multiple sessions over several days
- Search often provides entry point for browsing and search and browsing are inter-mixed
- Expectations from search are increasing

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From Search to Search-driven Applications

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- Health
- Education

Humanity's greatest advances are not in its discoveries – but in how those discoveries are applied to reduce inequity.

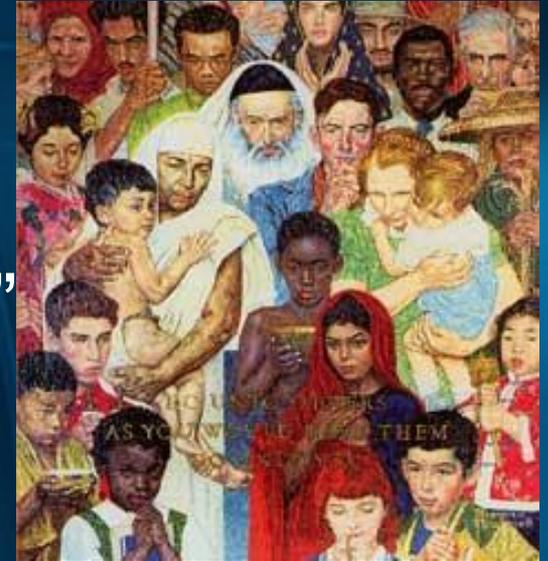
Bill Gates

Harvard Commencement. June 7,
2007

Humane Computing

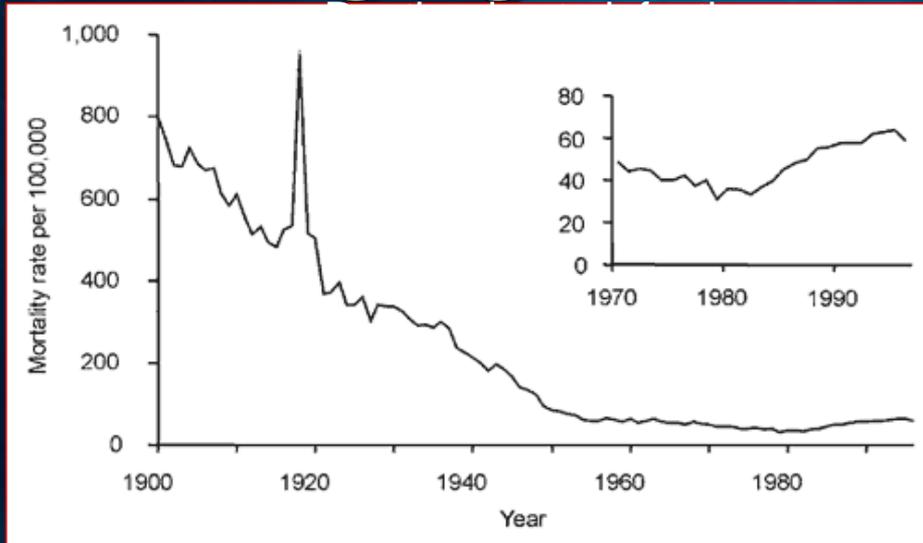
“Is it right? Is it just?
Is it in the interest of mankind?”

Woodrow Wilson. May 30, 1919.

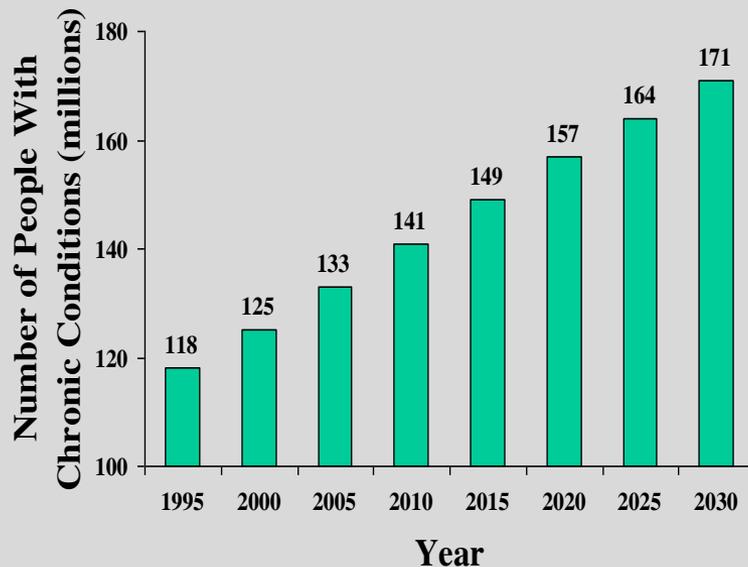
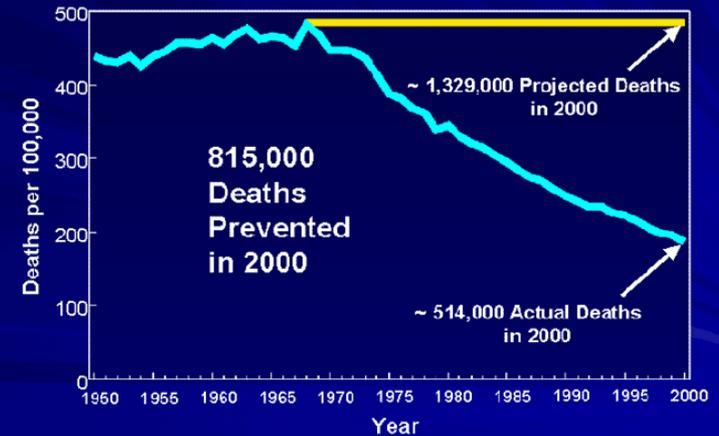


*Applications to benefit individuals
and society*

Changing Nature of Disease



Coronary Heart Disease Age-Adjusted Death Rates: Actual and Expected United States, 1950-2000



- **New Challenge:** chronic conditions-illnesses and impairments expected to last a year or more, limit what one can do and may require ongoing care
- In 2005, 133 million Americans lived with a chronic condition (up from 118 million in 1995)

Technology Trends

- Tremendous simplification in the technologies for *effortlessly* capturing useful personal information

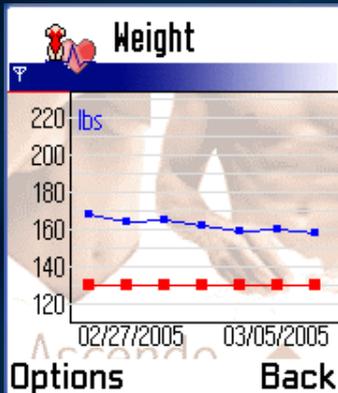
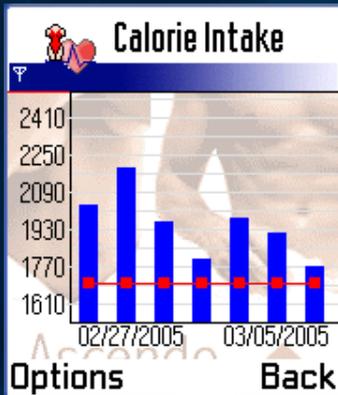


- Dramatic reduction in the cost and form factor for personal storage



- Cloud Computing

Personal Health Analytics



Fitness Assessment on 07/09/2000

Client: Paul Moore

No of Prev Tests: 1 | Last Test: 14 Jun 2000

V02 - Bike Test Without Watts Meter

	Actual	Predicted	Previous	L/min	Actual	Predicted	Previous
Load Kg	150		N/A	Aerobic	3.58		3.58
Rpm	50		N/A	ml/Kg/min			
Watts	150	166	N/A	V02	44	33	44
		70% 90%		V02 Comment	Above Average V02		
End	140	128	165	140			

Graph Options:
 Aerobic Capacity V02 Skip this Test

Navigation: Ht/Wt | Lung | BP | Body | Anatomy | V02 | Flexibility | Endurance | Explosive

Enter the Load in Kgs. << Cancel >>

Personal Data Mining



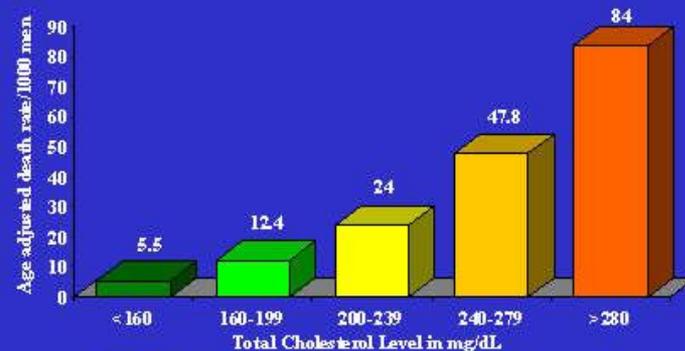
Charts for appropriate demographics?

Optimum level for Asian Indians: 150 mg/dL
(much lower than 200 mg/dL for Westerners)
Due to elevated levels of lipoprotein(a)*

Distributed computation and
selection across millions of nodes

Privacy and security

Graph 7: Risk of CAD Death in Young Men
according to Baseline Cholesterol levels^{107*}



*11,017 men aged 18-39 at baseline 25-year follow-up

*Enas et al. Coronary Artery Disease In Asian Indians. *Internet J. Cardiology*. 2001.

India's Education System: 1951-2002

	1951	1981	2002(*)	
Literacy Percentage	18.33%	43.57%	65.38%	
Educational Institutions				
Primary	209671	494503	664041	
Upper Primary	13596	118555	219626	
High/Hr. Secondary & Inter & Pre Junior College	7416	51573	133492	
Enrollements (in millions)				
Primary	19.2	73.8	113.9	
Upper Primary	3.1	20.7	44.8	
High/Hr. Secondary & Inter & Pre Junior College	1.5	11	30.5	
Dropout Rates (%)	NA	82.5	66	
Teachers (in '000)				
Primary	538	1363	1928	
Upper Primary	86	669	1157	
High/Hr. Secondary & Inter & Pre Junior College	127	926	1777	
Pupil Teacher Ratio				
Primary	20	38	43	
Upper Primary	20	33	34	
High/Hr. Secondary & Inter & Pre Junior College	21	27	34	
Public Expenditure (% of GDP)	0.64%	2.92%	4.02%	

Significant achievements, but problems remain ...

Poor performance

- 39% dropouts in primary, additional 15.6% in secondary, additional 11.7% in higher secondary
- Pass out ratio is 50% at Class X and majority of them pass in 3rd division
- Less than 8% finish all schooling to qualify for a college education

Poorly trained teachers

- 51% of primary teachers are higher secondary or below
- Only 44% have received in-service training
- Absence of learning material for teachers to update their knowledge

Poor teacher-student ratios

- Ratio in primary is 1:43, secondary and Higher secondary is 1:34. About 9% of primary schools have a teacher-student ratio > 1:100
- 1.4% of primary schools have no teachers, 19% have only one teacher for all classes

Poor quality of material

- Poor quality of textbooks, out-dated curriculum

Attacking Complex Problems*

Framework

1. Define goal.
2. Find the highest-leverage approach.
3. Discover the ideal technology for that approach.
4. In the meantime, make the smartest application of the technology on-hand.

Application to Education

1. Quality education to all.
2. New pedagogy.
3. Individualized learning with teacher as a discussant.
4. Internet-based mass collaboration to help teachers teach better and improve the educational infrastructure.

Education Web

- Participation of experts, teachers, parents and students in the development and revisions of curricula
- Sharing and collaborative development of lectures, assignments, tests, *etc.*
 - Tools for capturing feedback on textbooks (errors, better explanations, supplementary readings)
 - Collaborative translation and localization of educational material



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Search Labs

Invent next in Internet search and applications



machine learning
information retrieval
query processing
data management
NLP
computational economics
game theory
web mining
algorithms
privacy
link analysis
parallel mining
ranking
inconsistent data

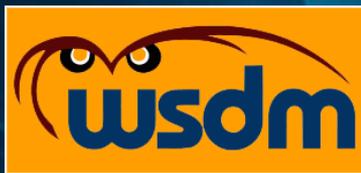


STATE VOTER REGISTRATION DATABASES

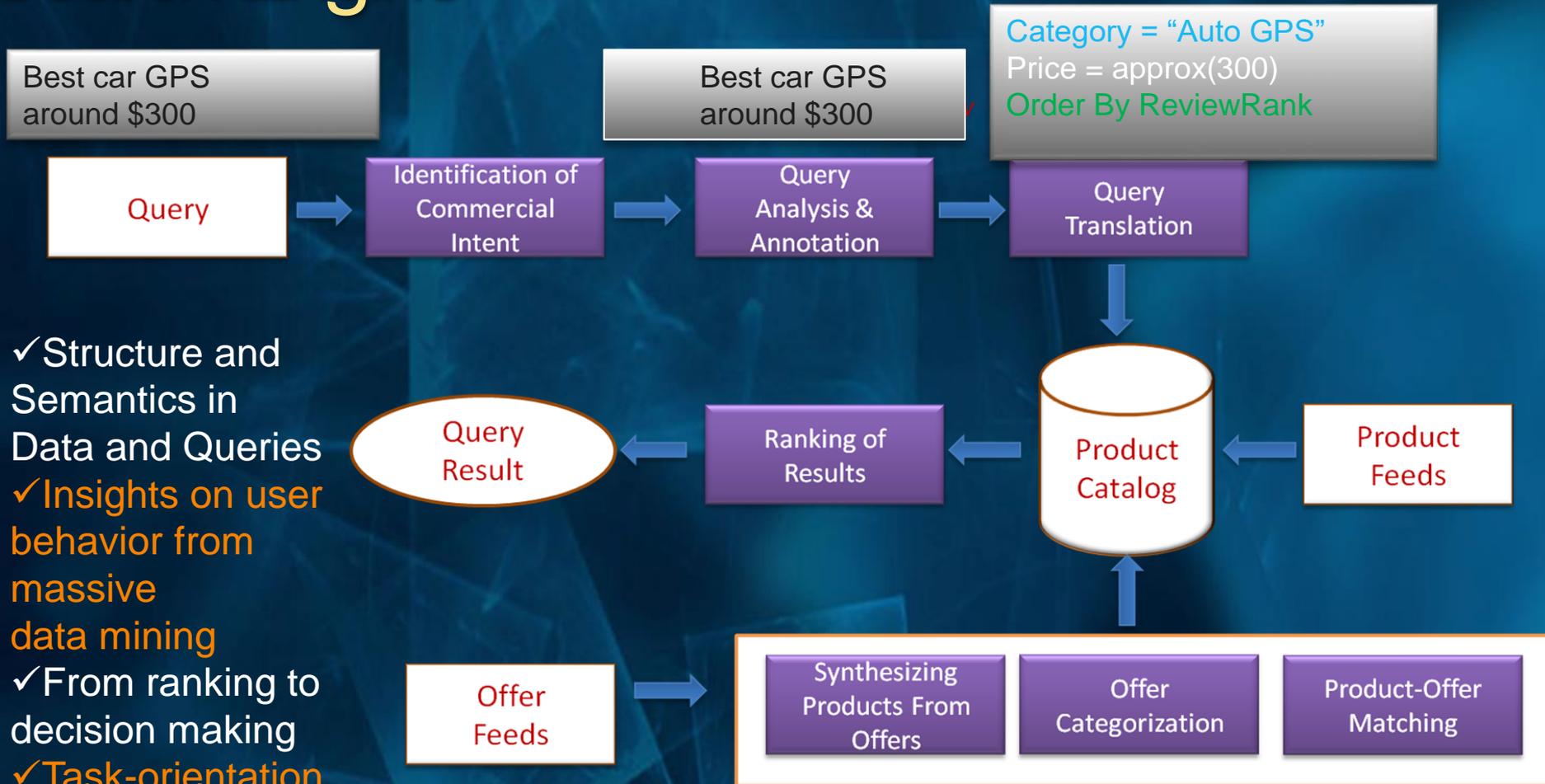
THE NATIONAL ACADEMIES
Advisors to the Nation on Science, Engineering, and Medicine

Committee on State Voter Registration Databases
Computer Science and Telecommunications Board
Division on Engineering and Physical Sciences
NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

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Washington, D.C.
www.nap.edu

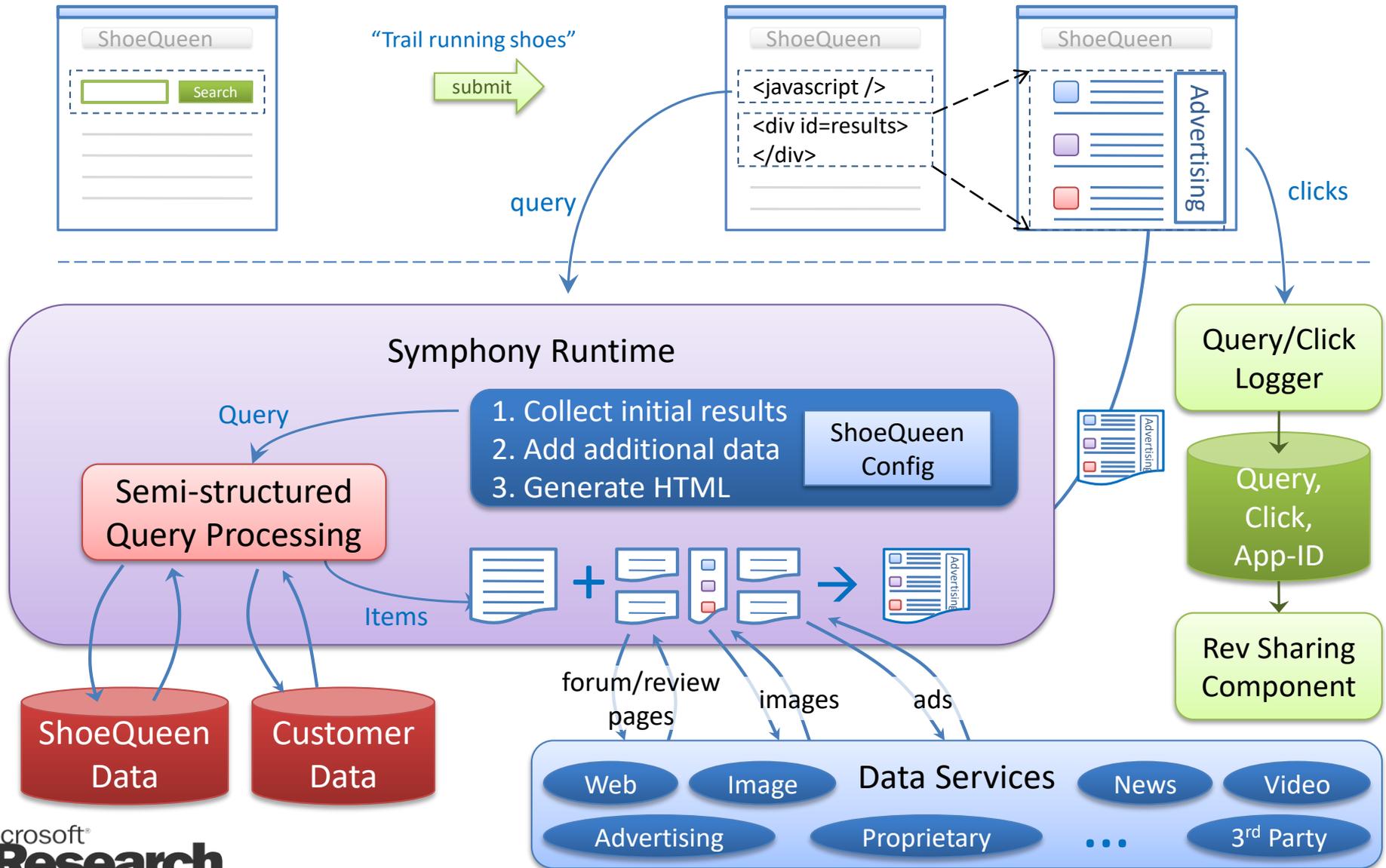


Lincoln: Experimental Commerce Search Engine



Symphony

Enable non-developers to create and monetize custom search applications that combine their data and knowledge with Search services.





- Tools for creating and updating content (Wikipedia++)
- Trust and authoritativeness of content
- Personalization of search to find the material suitable for one's own style of teaching
- Bootstrapping and incentives

Concluding Remarks

- Search is becoming an essential “utility”
- Need to develop new foundations and abstractions to take search to next level
- Academia can (and must) play a leading role

Thank you!



Search Labs' mission is to invent next in Internet search and applications

What I Ended up Buying?

cashback Offers - [Web](#)

See Also - [cashback Home](#), [Stores](#), [Your cashback Account](#), [How This Works](#)



Garmin Nuvi 755T Portable GPS Navigation System w/4.3" Widescreen Display (0100071530)

Garmin continues to build up its n?vi 7xx series portable GPS navigators with its n?vi 755T which adds a number of handy routing and communication features to an already impressive list of specs including a 4.3-inch widescreen display text-to-speech capabilities media player and FM transmitter for transmitting audio-including directions and MP3 music and audiobooks-from the device to your car radio.

Go
Li
Pu
po
bu
Se

Stores	Free Shipping	Store Price	cashback	Bottomline Price
	No	\$327.95	6.00%	\$308.27
	Yes	\$339.99	6.00%	\$319.59
	Yes	\$342.79	6.00%	\$322.22
	Yes	\$329.00	2.00%	\$322.42
	Yes	\$334.80	2.80%	\$325.43
	No	\$339.27	3.00%	\$329.09
	Yes	\$339.00	2.50%	\$330.52
	No	\$359.99	8.00%	\$331.19

Store Price \$359.99

Discount 8.00%

cashback \$28.80

Bottomline Price \$331.19

[Go To Store](#)

MORE ABOUT ELECTRONICA DIRECT
Electronica Direct offers the latest computer software and household goods all at guaranteed low prices. Electronica Direct has been selling on the internet for over a million satisfied customers served! We are committed to excellence in both product quality and customer service.

cashback summary

Pending:	\$29.20
Available:	\$0.00
In process:	\$0.00
Rewarded:	\$0.00
Total cashback:	\$29.20

All | [Pending](#) | [Available](#) | [In process](#) | [Rev](#)

Date of activity ▼ Name

February 5, 2009 ▶ Electronica Direct

Don't see all your cashback rewards? [Find out w](#)



Search, shop and save

Use Live Search cashback to find what you know and trust. And get cashback

Last Resort!

The image shows a screenshot of a Bing search results page for the query "bhutan". The search bar at the top contains the word "bhutan" and is circled in red. Below the search bar, the Bing logo is visible on the left. The main content area displays "ALL RESULTS" and "1-20 of 25,100,000 results". A sidebar on the left lists navigation options: BHUTAN (highlighted), Images, Map, Weather, History, Culture, and Recipes. Below the sidebar, there are sections for "RELATED SEARCHES" (MSN Bhutan, Bhutan Travel, Bhutanese Songs, Capital Bhutan, Bhutan Homes) and "SEARCH HISTORY" (Turn on search history to start remembering your searches, Turn history on). The main results area features a section titled "Images of bhutan" with five image thumbnails: a map of Bhutan, a couple in traditional dress, a cliffside building, a traditional Bhutanese house, and two women in red traditional attire. Below the images are links for "see more", "large images", and "black & white". The first search result is a Wikipedia entry titled "Bhutan - Wikipedia, the free encyclopedia", followed by a travel agency link "Kingdom of Bhutan" and another Wikipedia entry "Culture of Bhutan - Wikipedia, the free encyclopedia". At the bottom, there is a link for "Bhutan travel guide - Wikitravel". The footer of the page includes the Internet Explorer logo and the text "Intern".

bing

bhutan

BHUTAN

Images

Map

Weather

History

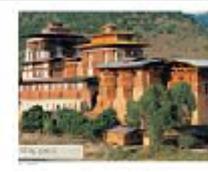
Culture

Recipes

ALL RESULTS

1-20 of 25,100,000 results · [Advanced](#)

[Images of bhutan](#)



[see more](#) · [large images](#) · [black & white](#)

[Bhutan - Wikipedia, the free encyclopedia](#)
The Kingdom of **Bhutan** (pronounced /buːˈtɑːn/) is a landlocked nation in South Asia, located at the eastern end of the Himalaya Mountains and is bordered to the south, east and ...
[Name](#) · [History](#) · [Government and politics](#) · [Military and foreign ...](#) · [Geography](#)
en.wikipedia.org/wiki/Bhutan · [Enhanced view](#)

[Kingdom of Bhutan](#)
BTCL **Bhutan's** number one travel agency, since 1991.
www.kingdomofbhutan.com · [Cached page](#)

[Culture of Bhutan - Wikipedia, the free encyclopedia](#)
Cradled in the folds of the Himalayas, **Bhutan** has relied on its geographic isolation to protect itself from outside cultural influences. A sparsely populated country bordered by .
[Religion](#) · [Cultural preservation](#) · [National dress code](#) · [Men and women in society](#)
en.wikipedia.org/wiki/Culture_of_Bhutan · [Enhanced view](#)

[Bhutan travel guide - Wikitravel](#)

Internet

How About Travel Sites?



i Sorry, no search results were found for bhutan

Search Results
30 matching results (for bhutan)

What are you looking for? BETA

bhutan

Search Expedia

Macleay Serviced Apartments, Potts Point hotels, NSW, Australia

This Sydney property is within 1 km of Elizabeth Bay House, Royal Botanic Gardens, and Art Gallery of New South Wales. Sydney Tower is also within 10 km of the property.

<http://www.expedia.com/pub/agent.dll/qscr=dspv/htid=40898/crti=0/rdct=1>

Build Your Trip

Flight + Hotel savings start here **i**

Search type:

One Destination

pplication

ladesh Barbados Belarus Belgium Belize Benin Bermuda **Bhutan** Bolivia Bosnia And Herzegovina Botswana Bouvet ...
Jesh Barbados Belarus Belgium Belize Benin Bermuda **Bhutan** Bolivia Bosnia And Herzegovina Botswana Bouvet ...

i We could not find any vacation packages in 'Bhutan (all)' that match your search criteria.

Leaving from:

Delhi

Going to:

Bhutan

Departing: Time:

7/13/2009

Any

Returning: Time:

7/17/2009

Any