

# Online Advertising: Paid Search Deep Dive

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# Agenda

- Session 1
  - Online Advertising- An Overview
  - Search Advertising
  - How it works?
- Session 2
  - Paid Search- Deep Dive
- Wrap-up
  - Some Challenging Problems
  - What can you do to learn more?

# Session 1

# Online Advertising- Overview

# YAHOO!

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hotels in seattle

Search

Options

Safe Search - On

 28,100,000 results for  
hotels in seattle:

- Show All
- Hotels.com
- Expedia
- Kayak
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- TripAdvisor

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City Guide

**Hotels**

Restaurants

Things To Do

Flights

## Hotels in Seattle, WA

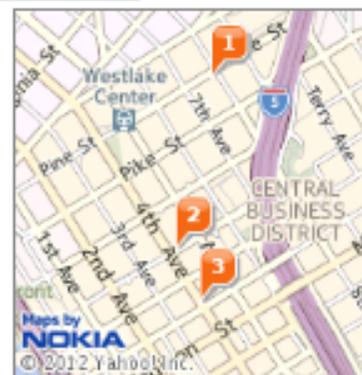
[travel.yahoo.com](#)

Under \$100 | \$200 | \$300

- Grand Hyat...** ★★★★★ (43 Reviews) From \$305
- The Fairmo...** ★★★★★ (33 Reviews) From \$357
- Hotel Mona...** ★★★★★ (35 Reviews) From \$339

[More Hotels in Seattle](#)

Check-in	Check-out	Guests	Find Price
7/11/2013	7/17/2013	1	<input type="button" value="Find Price"/>

[More Booking Options](#)


## Seattle Hotels: Compare Hotels in Seattle, WA | Expedia

Need a hotel in Seattle? Choose from over 222 Seattle hotels with huge savings. Whatever your budget, compare prices and read reviews for all our Seattle hotels.

[www.expedia.com/Seattle-Hotels.d178307.Travel-Guide-Hotels](#) - [Cached](#)

## Belltown Hotels - Search hotels near the Belltown ...

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Sponsored Results

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Official Site. Panoramic Lake Union

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28,100,000 RESULTS

[75 Hotels in Seattle WA - Lowest price guarantee!](#)

Ads

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Book your Hotel in Seattle WA.

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**1** 620 Stewart St, Seattle · (206) 728-6299  
[Directions](#) · 3 star hotel · ★★★★★ 43 reviews

\$208

Avg. rate

[Downtown Seattle Washington Hotel - Sorrento Hotel](#)[www.hotelsorrento.com](#)

Experience historic charm, modern services and luxury accommodations at a true Seattle original. Sorrento Hotel is nestled in downtown Seattle, Washington.

**2** 900 Madison St, Seattle · (206) 343-6158  
[Directions](#) · 4 star hotel · ★★★★★ 65 reviews

\$236

Avg. rate

[Downtown Seattle Hotels: The Luxury Boutique Hotel Monaco Seattle](#)[www.monaco-seattle.com](#)

Hotel Monaco is a top-rated downtown Seattle hotel, a boutique luxury Kimpton hotel with a sense of fun, perfectly located in the heart of downtown in walking ...

**3** 1101 4th Ave, Seattle · (206) 621-1770  
[Directions](#) · 4 star hotel · ★★★★★ 31 reviews

\$259

Avg. rate

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## Hotels

Near Seattle, Washington

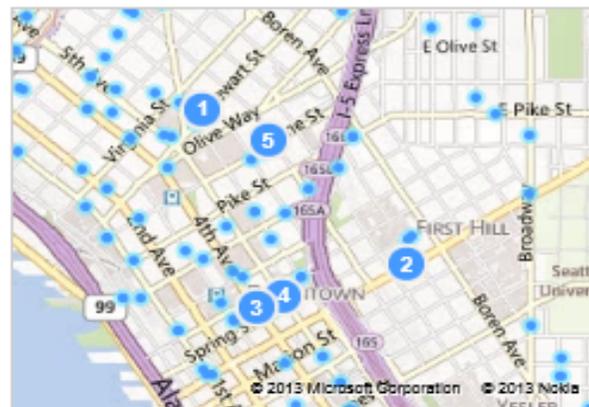
Check in

Check out

07/12/2013



07/14/2013

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# Online Advertising

What is online advertising?



# Online Advertising

What is online advertising?

Simply put= "Advertising delivered via the Web or other digital media"

Otherwise, very similar to traditional advertising

- The integration of marketing, planning, and strategy with technology
- Used to target messages to advertisers' customers or prospects



# Why online?

- Short lead times
- Targeting
- Immediate results
  - Ability to refine quickly if needed
- Brand Interaction
  - Direct
  - Seamless experience between exposure to ad and action
- Drives offline sales
  - Consumers research online before they buy
  - Timely information both pre- and post-buy

# Is Online Advertising Intuitive?

- First of all, it is any other advertising, targeted to consumers like us
- Parallels with supply-demand optimization
  - **Supply: Pages where ads are shown**
  - **Demand: Ads that are shown**
- Parallels with retail stores (multi-category)- think of Walmart, Macys, Target, Shopper's Top, Lifestyle
  - **Retail Mantra- "right product in the right store at the right time in right quantity at right price"**
  - **Online Advertising – "right product to the right user at the right time"**

# Advertiser's Objective

## Performance/ Direct

- Invites visitor to contact advertiser directly
- Measures of Success:
  - Frequency of visitor taking desired action
  - Clicking, purchasing, signing up, etc.
- Direct Advertisers' Goals:
  - Drive sales or sign ups with efficiency
  - Minimize dollars spent per conversion
  - Maximized revenue from conversion

## Brand

- Sum total of company's identity
- Brand Advertisers' Goals:
  - Build awareness
  - Broad reach; exposure
  - How often and how many unique visitors see ads
- Brand Interaction

All said and done, it is all about ROI

# What are some types of Online advertising?

- Search, Display, Contextual, Mobile, Games, Video, Local
- Some parallels in offline world?



hotels in seattle

28,100,000 RESULTS

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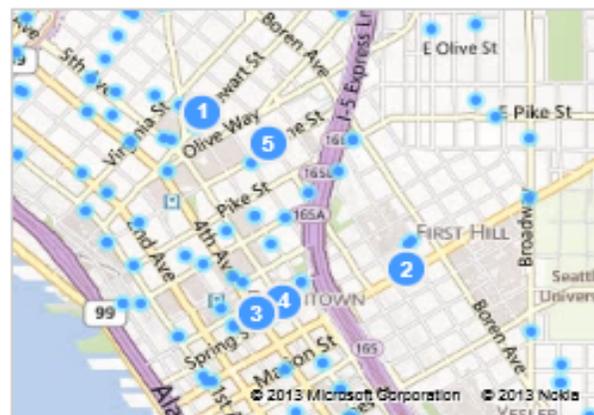
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Near Seattle, Washington

Check in   Check out



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## Morsi under house arrest, new president to be sworn in

Reuters | 17 min ago

Egypt's army is holding Morsi at a military facility in Cairo. The constitutional court chief justice, Adli Mansour, will be sworn in to replace the ousted President.

- Morsi's fall a blow to Islamists | In pics
- Statement by Egypt's military chief
- Egypt shuts down Islamist-run TV channels

## Unravelling Ishrat encounter: How the conspiracy was hatched and who executed it

Prashant Dayal

The CBI will file a second chargesheet in the Ishrat Jahan encounter case on July 26 and there are expectations that some IB officers may be named then.

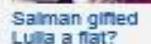
- Gujarat police and IB killed Ishrat, 3 others: CBI



Dramatic train rescue on camera



'Opposition has hired rapists'



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Morsi removed from power



SRK welcomes 3rd child



Bips' holiday in Ooty



Babes married to businessmen

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## MOST RECENT ▶

Results 1 - 3 of about 27,800

**Wayne Rooney hails Fabio Capello as England's 'severe dad' ...**

January 27 2010 | By Telegraph staff | Sport

Manchester United forward Wayne Rooney has hailed Fabio Capello as England's father figure and believes the Italian has brought the best out of him this season.

**David Beckham: I won't quit football after World Cup**

January 18 2010 | By Telegraph staff | Sport

spotlight



movies store >



television store >





# in-app ads



# Terminology you should be aware of

## KPIs and More ..

- Performance vs. Brand
- Supply / Inventory/ Traffic
- Impression
- Demand (Ads)
- KPIs: CTR, Coverage, PVs, RPM
- Pricing Models: CPA, CPC, CPL, CPM
- Conversion Rate

## Different Stakeholders

- Demand: advertisers, agencies, resellers, SEO, SEMs
- Platform: ad networks, ad exchanges, ...
- Supply: Publishers, aggregators,
- Users

# Search Ads Stakeholders..

<http://www.lumapartners.com/lumascape/search-lumascape/>

# SEARCH LUMAscape



# Search Advertising

# Search Overview : Algorithmic vs Paid Search

The image shows a screenshot of a Bing search results page for the query "travel". The browser window is titled "travel - Bing - Windows Internet Explorer" and the address bar shows "http://www.bing.com/search?q=travel&form=QBRE&qs=n&sc=8-5". The search results are displayed in a list format. The first result is a sponsored site: "Expedia Travel Deals - www.expedia.com" with the text "Any Travel You Book at Expedia Comes with Our Best Price Guarantee." This result is highlighted with a blue background and a purple arrow pointing to it with the text "Paid Results". Below this is a search form for flights with fields for "From", "To", "Leave" (3/12/2010), and "Return" (3/14/2010), and a "Find flights" button. The second result is "Yahoo! Travel - Airline tickets, cheap hotels, cruises, vacations ..." with the text "Find cheap airline tickets, hotels, great cruise and vacation packages, honeymoon travel guide, flight information and more, with Yahoo! Travel." This result is also highlighted with a blue background and a purple arrow pointing to it with the text "Algo Results". The right side of the page features a "Sponsored sites" section with three ads: "CheapOair® Official Site", "Cheap Flights - 65% Off", and "AA.com - Flight Search". These ads are highlighted with blue boxes and purple arrows pointing to them with the text "Paid Results". The bottom right of the page has a blue box with the text "Side Bar or Right Rail". The browser's status bar at the bottom shows "Done" and "Internet | Protected Mode: On".

# What is a Search Term?

Text a search user enters into a search engine's search box

A Search Term can be:

- A single word or a group of words
  - Not necessarily from a dictionary (example: "adventurework")
- Numbers, or alphanumeric, or a collection of text characters (example: "area code 425")

Search terms are also commonly referred to as queries and query terms



# Search Results

The image shows a Bing search results page for the query "family cruises". The search bar at the top left contains the text "family cruises" and is annotated with a purple box and an arrow pointing to a larger purple box labeled "Keyword typed in Search Query".

The search results are displayed under the heading "ALL RESULTS" with a sub-heading "1-10 of 63,000,000 results - advanced". The results include several sponsored sites and organic search results. Annotations highlight the keyword "Cruise" in the titles and "Family" in the copy of the sponsored ads.

**Keyword Detected in Ad Copy & Ad Title**

**Sponsored sites:**

- Discount Cruise Vacations** - Cruises.AmericasVacationCenter.Com  
Save Up To 75% on Your Getaway! Book Your Cruise Now.
- Carnival Cruise Lines** - carnival.com/family  
Carnival "Fun Ship" Cruises For The Whole Family! Let The Fun Begin.
- Royal Caribbean Cruises** - www.RoyalCaribbean.com  
Spend Time With Your Family Create Memories, & Discover New Places.
- Family Cruise Deals**  
Save up to 80% on Family Cruises. Lowest Prices on the Web. www.Cruises.com/Family

**Organic search results:**

- FamilyCruises.com - The Family Cruise Vacation Specialists**  
Family Cruise Specialists offering family cruise deals via more than 490 locations coast to coast. www.familycruises.com - cached page - mark as spam
- Best Family Cruises, Family Cruise Vacations - Royal Caribbean ...**  
Best Family Cruises: Royal Caribbean offers the best family cruise vacations. www.royalcaribbean.com/allaboutcruising/familycruising/home.do - cached page - mark as spam
- Family Cruise | Family Vacation Ideas | Nickelodeon Family Cruise**  
The Nickelodeon Family Cruise is a great family vacation idea featuring your favorite Nick characters & stars aboard a luxurious Royal Caribbean Cruise ship. www.nick.com/minisites/familycruise - cached page - mark as spam
- Family Cruise - Best Family Cruises and Cruise Deals**  
Family cruises, family cruising guide. Best cruises for kids, family vacations, family reunions. Reviews and tips for cruising with children. www.cruisecritic.com/cruisestyles/area.cfm?area=23 - cached page - mark as spam

**Left sidebar:**

- ALL RESULTS
- News
- RELATED SEARCHES
- Best Family Cruises
- Cheap Family Cruises
- Disney Family Cruise
- Christian Family Cruise
- Family Vacation
- Royal Caribbean
- All Inclusive Cruises
- Carnival Cruise
- SEARCH HISTORY
- family cruises
- family cruise
- family vacations
- digital cameras
- digital camera
- See all
- Clear all | Turn off

# Search Overview : The Paid Search "Auction"



Start with a group of advertisers....

86¢

12¢

89¢

84¢

84¢

75¢

\$1.20

99¢



...interested in buying ads when users search on the keyword 'travel'...



...and the specific ads each advertiser wants displayed...

[Travel with Expedia.com](http://www.expedia.com)  
Any Travel You Book at Expedia Comes With Our Best Price Guarantee.  
[www.expedia.com](http://www.expedia.com)

[CheapOair® Official Site](http://www.CheapOair.com)  
Save BIG on All Airline Tickets. Book Now & Get an Extra \$10 Off.  
[www.CheapOair.com/Air-Travel](http://www.CheapOair.com/Air-Travel)

[Book Travel](http://www.Travelocity.com)  
No One Gets Your Vacation for Less with Travelocity PriceGuardian.  
[www.Travelocity.com](http://www.Travelocity.com)

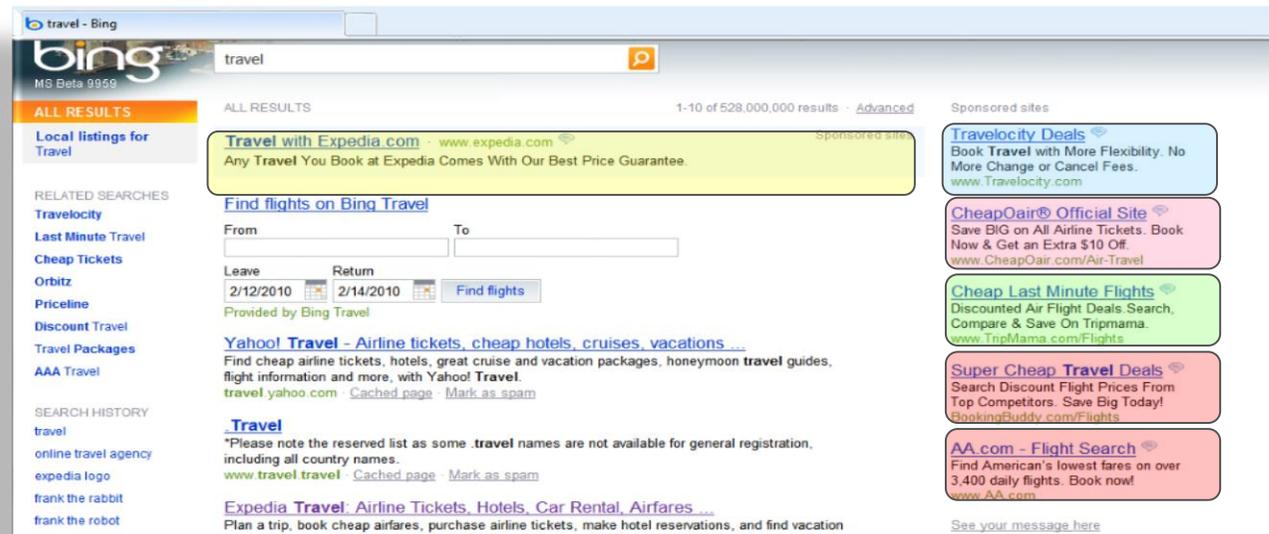


...and finally, the price each advertiser is willing to pay per click.

# Search Overview : Paid Search Auction Simplified



**Auction Results**

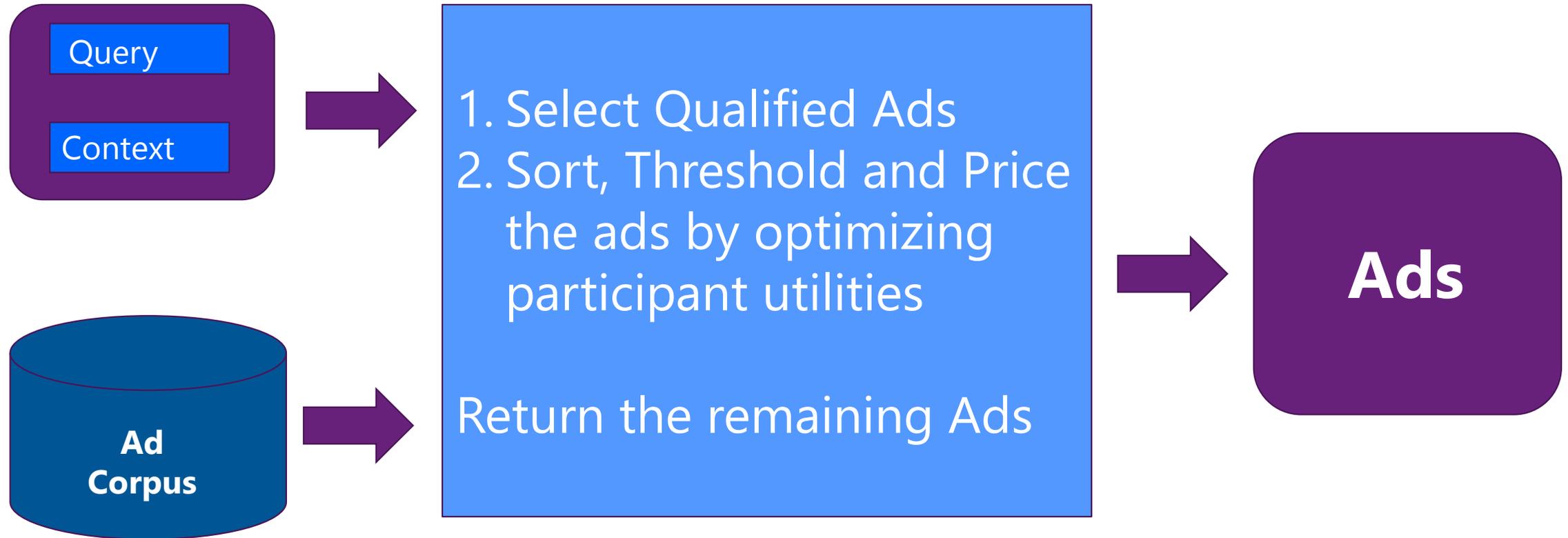


# Designing the Machine

# Lets design the system...



# Lets design the system...



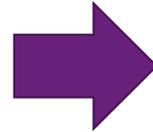
# Step 1: Selecting Qualified Ads

The most obvious approach

laptops



Keywords	Ads
car	{ads}
laptop	{ads}
laptops	..
....	..
cheap laptop	..
....	{ads}



## Problems with this approach

- Very few ads get qualified from X-illions in the ad corpus
- Low impression and click volume, low prices
- Advertisers cannot guess and bid on all possible queries users search

➔ Opportunity to optimize utilities better

# Step 1: Selecting Qualified Ads



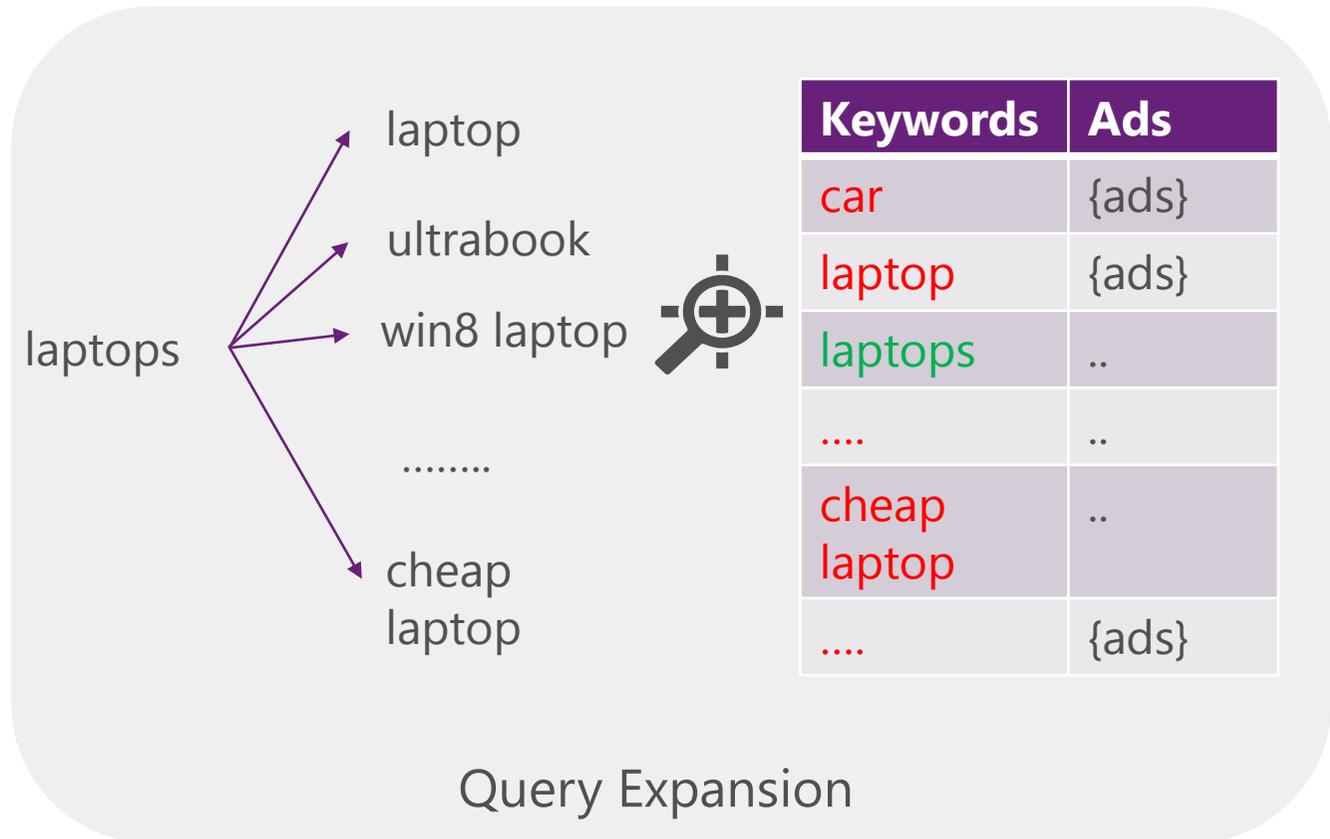
How do we fix this problem with the most obvious approach?

## 💡 Query Expansion

$f(\text{laptops}) = \{\text{laptop, ultrabook, macbook, cheap laptop, deals on laptop,.....}\}$

Can you suggest a few ways to come up with this expanded list?

## 💡 Keyword Expansion



# Step 1: Selecting Qualified Ads

We selected a huge list of ads, but are all these qualified?

How do we qualify the ads?

Simple: Based on utility of the participants

User's Utility

How?

Publisher's Utility

How?

Advertiser's Utility

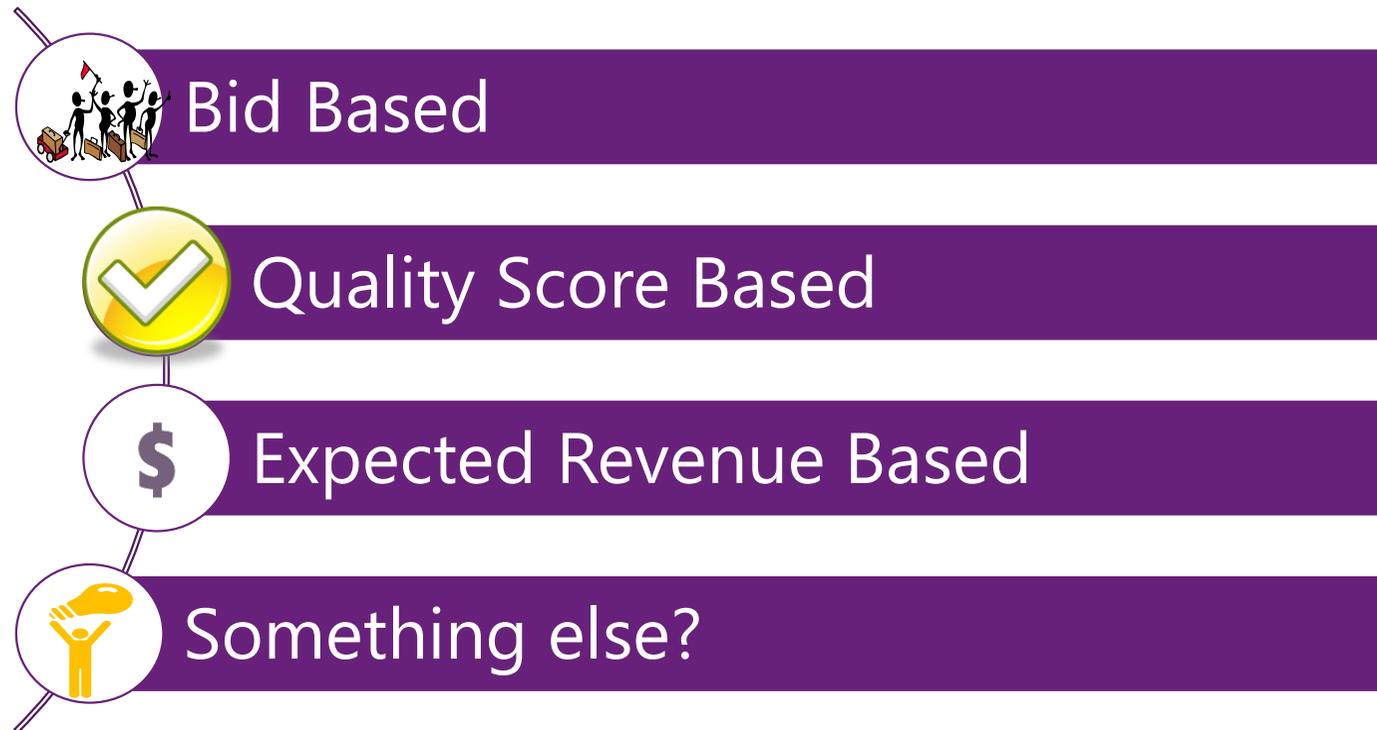
How?

...from X-illions of ads in corpus, now we have '000 in hand

## Step 2: Sort, Threshold and Price

From '000s, how do we select dozens?

*Its as easy as sorting and picking from top. The million dollar (literally) question is how do we score for sorting.*



## Step 2: Sort, Threshold and Price

From a sorted list of '000s of Ads, how many ads do we serve?



- *As many as no. of slots?*

## Step 2: Sort, Threshold and Price

From a sorted list of '000s of Ads, how many ads do we serve?



- ~~As many as no. of slots?~~
- Maximize overall utility of the marketplace

## Step 2: Sort, Threshold and Price

How much should we charge for click?



To build a healthy market, pricing mechanism must ensure:

- Advertiser bid their true value
- Price is competitive
- Advertiser's RoI is positive

Formulation is typically a variation of GSP and this is evolving as we are talking!

# The Gold Mine

- Multi billion dollar business, a small algorithmic improvement means tens of millions of dollars
- Wide play area – query expansion, ad qualification, scoring, pricing and many more areas that are all million dollars
- Wide play area – need expertise from diverse backgrounds e.g. computer science, machine learning, statistics, microeconomics, mechanism design, psychology, UI design

Sounds interesting?

Feel free to reach out to: [dbapna@microsoft.com](mailto:dbapna@microsoft.com), [yhouhan@microsoft.com](mailto:yhouhan@microsoft.com)

# MarketPlace 101

# Search Advertising Metrics

- Impressions
  - Number of times an online ad is delivered to web pages.
- Clicks
  - Clicks represent the number of times a potential customer clicked an ad displayed in SERPS for a given online advertising program.
  - The number of clicks can never be greater than the number of impressions.
- Click Through Rate (CTR)
  - Rate at which visitors view and subsequently click an ad.
  - Reflected as a percentage of impressions divided by clicks.
  - NOTE: A higher CTR percentage implies higher number of clicks as relates to the impression that were served. A lower CTR percentage implies higher number of impressions, but fewer clicks.

# Search Advertising Metrics

- Cost per click (CPC)
  - A performance-based pricing model typically used for Search advertising.
  - CPC, pays publishers based on number of clicks on a specific ad.
  - Most ad networks only pay once per click per user within a specified time period, generally 24 hours or more.
- Cost per action (CPA)
  - An ad payment model in which advertisers pay only when an ad display leads to a completed sale, registration, download, etc.
  - Virtually all affiliate network advertising can be thought of as CPA-based.
  - Bing CashBack has a CPA Model.
  - Consumers get cash back when they buy eligible products and advertisers list their products at a fixed CPA and pay only for sales completed.

# Key Performance Indicators

- Ad Click thru Rate (ACTR)
  - The rate at which an ad is clicked with respect to the total number of ad impressions
  - $\text{Ad CTR} = \text{Total Clicks} / \text{Total Impressions}$
- Price per Click or Cost per Click (PPC or CPC)
  - Revenue generated per ad click
  - $\text{PPC} = \text{Total Revenue} / \text{Total Clicks}$
- Revenue per Mille (RPM)
  - Revenue generated per 1000 searches
  - $\text{RPS} = (\text{Total Revenue} / \text{Total SRPV's}) * 1000$
- Click Yield (CY)
  - Rate at which an ad is clicked with respect to the total # of Searches
  - $\text{Click Yield} = \text{Total Clicks} / \text{Total SRPV's}$

# Elements to Success in Search

- Advertisers **purchase** keyword terms based on:
  - Traffic volume
  - Relevancy
  - Performance
  - Price
- AdCenter **ranks** Advertisers' terms based on:
  - Relevancy
  - Click-through Rate
  - Maximum Bid Amount
- AdCenter **rewards** the highest ranking Advertisers with:
  - Top positioning
  - Great converting users

# How Google Makes 100M/day

<http://searchenginewatch.com/article/2220372/How-Google-Rakes-In-Over-100-Million-in-Search-Advertising-Daily-Infographic>



# 24 HOURS in the GOOGLE ECONOMY

Key Google Advertising Metrics for Q3 2012

Google Search

Google Display Network

HOW DOES GOOGLE MAKE OVER  
**\$100 MILLION A DAY**  
WITH SEARCH ADVERTISING?  
and Billions for Advertisers and the Economy!

Impressions are the total number of ads displayed

Daily Ad IMPRESSIONS  
per day in Q3 2012

AVERAGE COST PER CLICK  
in Q3 2012

vs Q2 2012  
% of change

-16.5%

\$0.53

5.6  
BILLION

24.2  
BILLION

\$0.35

-18.2%

vs Q2 2012  
% of change

vs Q2 2012  
% of change

-12.4%

3.47%

AVERAGE DAILY CLICKS  
in Q3 2012

AVERAGE CLICK THRU RATE  
in Q3 2012

0.18%

+13.8% vs Q2 2012  
% of change

% of change from Q2 2012

+21.6%

193.2  
MILLION

44.7  
MILLION

+29.1%

AVERAGE CONVERSION RATE  
in Q3 2012

AVERAGE NUMBER OF DAILY CONVERSIONS  
Completed Sales, Leads Generated, Etc. in Q3 2012

5.63%

10.9  
MILLION

2.1  
MILLION

4.68%

# Categories of Business

Travel

Shopping

Finance

Internet and Telecom

Jobs & Education

Computers and Electronics

Home and Garden

Business and Industrial

Beauty and Fitness

Auto and Vehicles

# 1. FINANCE

Daily Stats for Q3\*

Google Search

Google Display Network

Ad Impressions	617 M	5.32 B
Click Thru Rate	3.67%	0.10%
Number of Clicks	22.7 M	5.24 M
Cost Per Click	<b>\$3.09</b>	\$1.03
Conversion Rate	6.12%	5.12%
Completed Sales**	<b>1.39 M</b>	268 K

Highest CPC

Most Conversions per day

TOP 5 ADVERTISERS  
in Finance  
in Q3 2012



- 1 State Farm
- 2 GEICO
- 3 Quicken Loans
- 4 Capital One
- 5 Bank of America

# 2. TRAVEL

Daily Stats for Q3\*

Google Search

Google Display Network

Ad Impressions	345 M	2.14 B
Click Thru Rate	4.88%	0.18%
Number of Clicks	16.8 M	3.89 M
Cost Per Click	\$0.29	\$0.28
Conversion Rate	<b>1.45%</b>	2.99%
Completed Sales**	244 K	116 K

Lowest conversion rate

TOP 5 ADVERTISERS  
in Travel  
in Q3 2012



- 1 Expedia
- 2 hotels.com
- 3 BOOKING.COM
- 4 priceline.com
- 5 KAYAK

### 3. SHOPPING

Daily Stats for Q3\*

	Google Search	Google Display Network
Ad Impressions	232 M	1.21 B
Click Thru Rate	5.23%	0.23%
Number of Clicks	12.1 M	2.81 M
Cost Per Click	\$0.25	\$0.27
Conversion Rate	3.58%	2.19%
Completed Sales**	434 K	61.4 K

#### TOP 5 ADVERTISERS in Shopping in Q3 2012



- 1 amazon.com
- 2 ebay
- 3 Target
- 4 Walmart
- 5 sears

### 4. JOBS & EDUCATION

Daily Stats for Q3\*

	Google Search	Google Display Network
Ad Impressions	660 M	2.06 B
Click Thru Rate	1.72%	0.13%
Number of Clicks	11.3 M	2.62 M
Cost Per Click	\$1.80	\$0.34
Conversion Rate	6.09%	2.09%
Completed Sales**	690 K	54.8 K

#### TOP 5 ADVERTISERS in Jobs & Education in Q3 2012



- 1 University of Phoenix
- 2 monster.com
- 3 ITT Technical Institute
- 4 DeVry
- 5 KAPLAN UNIVERSITY