

Site Design

SWE 432, Fall 2017

Design and Implementation of Software for the Web

Today

- How do you help users understand if it is possible to do what they'd like to do?
- How do you help users find what they're looking for?
- How do you organize information in a site to maximize efficiency?

Analogy: Buying a chainsaw

- You walk in to a hardware store to buy a chainsaw. What do you do?

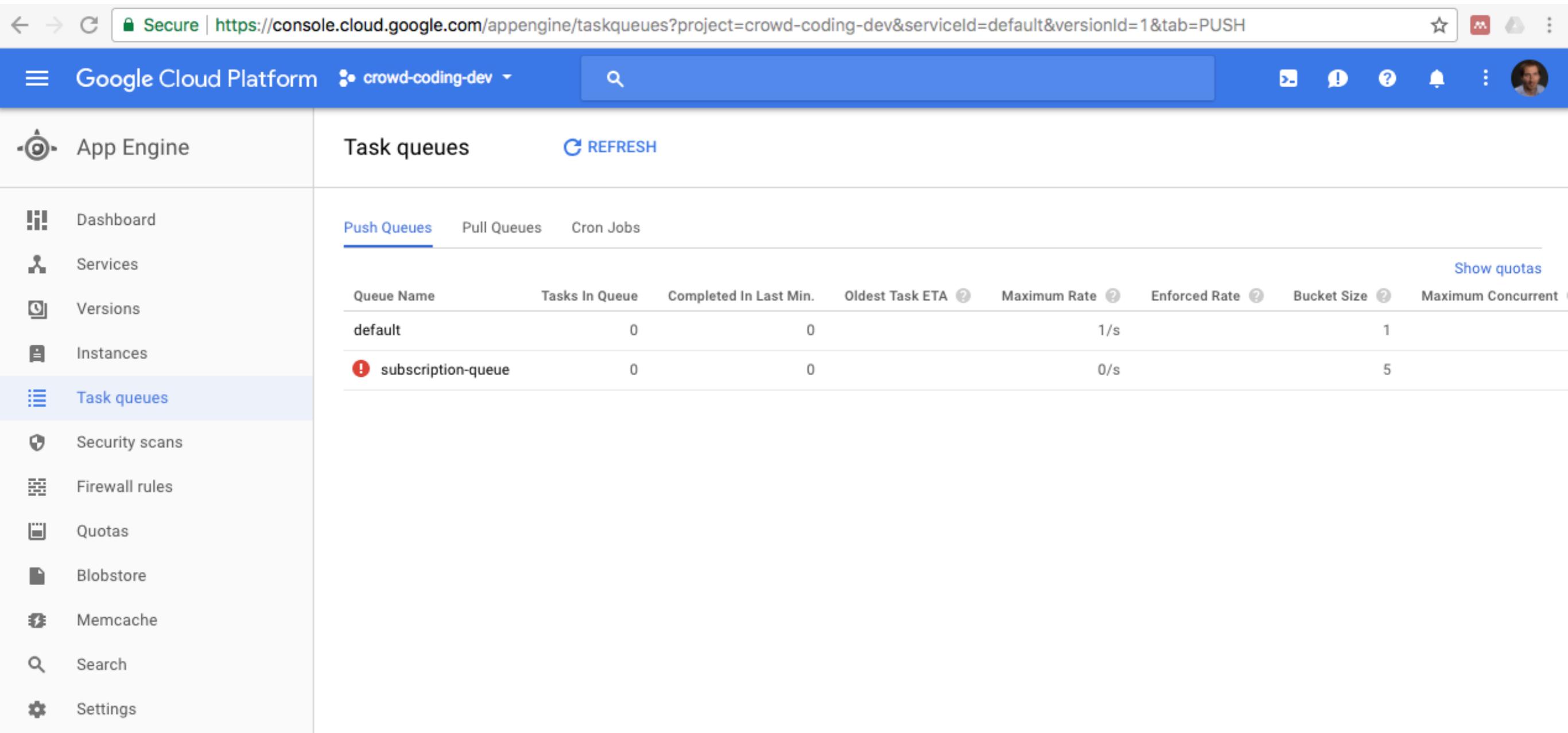
Site design

- If users can not find what they are looking for, they will leave.
- If users take a long time to find things, your software is not usable.
- Site design considers how users interact with information, including organization, labeling, and search
- Challenges (differences from physical world):
 - No spatial sense of scale. 50 pages? 500 pages? 50,000 pages?
 - No sense of direction. Which way did I just go?
 - No sense of location. No spatial anchoring of where I am now and how that relates to where I could go.

Planning

- Help users determine what they **can** do
- Support users in how they **determine** what to do

What can you do with this app?



The screenshot shows the Google Cloud Platform App Engine Task queues page. The left sidebar is titled 'App Engine' and includes links for Dashboard, Services, Versions, Instances, Task queues (which is highlighted in blue), Security scans, Firewall rules, Quotas, Blobstore, Memcache, Search, and Settings. The main content area is titled 'Task queues' and has a 'REFRESH' button. It shows two task queues: 'default' and 'subscription-queue'. The 'default' queue has 0 tasks in the queue, 0 completed in the last minute, and a maximum rate of 1/s. The 'subscription-queue' has 0 tasks in the queue, 0 completed in the last minute, and a maximum rate of 0/s. There are tabs for Push Queues, Pull Queues, and Cron Jobs. A 'Show quotas' link is located in the top right corner of the table.

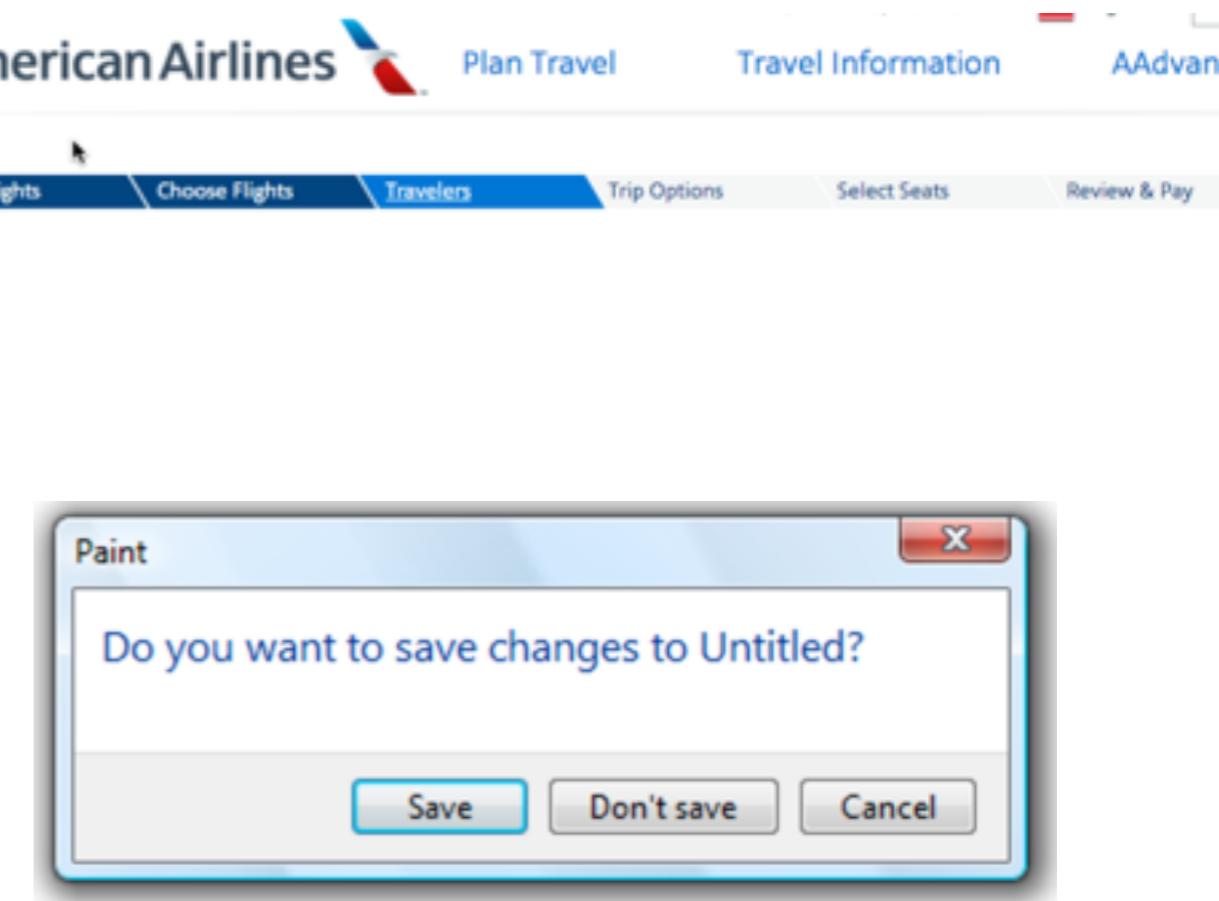
Queue Name	Tasks In Queue	Completed In Last Min.	Oldest Task ETA	Maximum Rate	Enforced Rate	Bucket Size	Maximum Concurrent
default	0	0		1/s		1	
subscription-queue	0	0		0/s		5	

Clear system task model

- Help users accomplish goals by providing clear model of how users should view system in terms of tasks
- Design to match users' conception of high level task organization
- Help users understand what features exist and how they can be used
- Help users decompose long tasks into small pieces
- Keep task context visible to minimize memory load

Effective planning

- Help users plan most efficient ways to complete tasks
- Keep users aware of task progress, what has been done and what is left to do
- Provide constraints to avoid transaction completion slips
 - e.g., prevent users from starting task and accidentally throwing away work mid-task



Orchestration & interaction flow

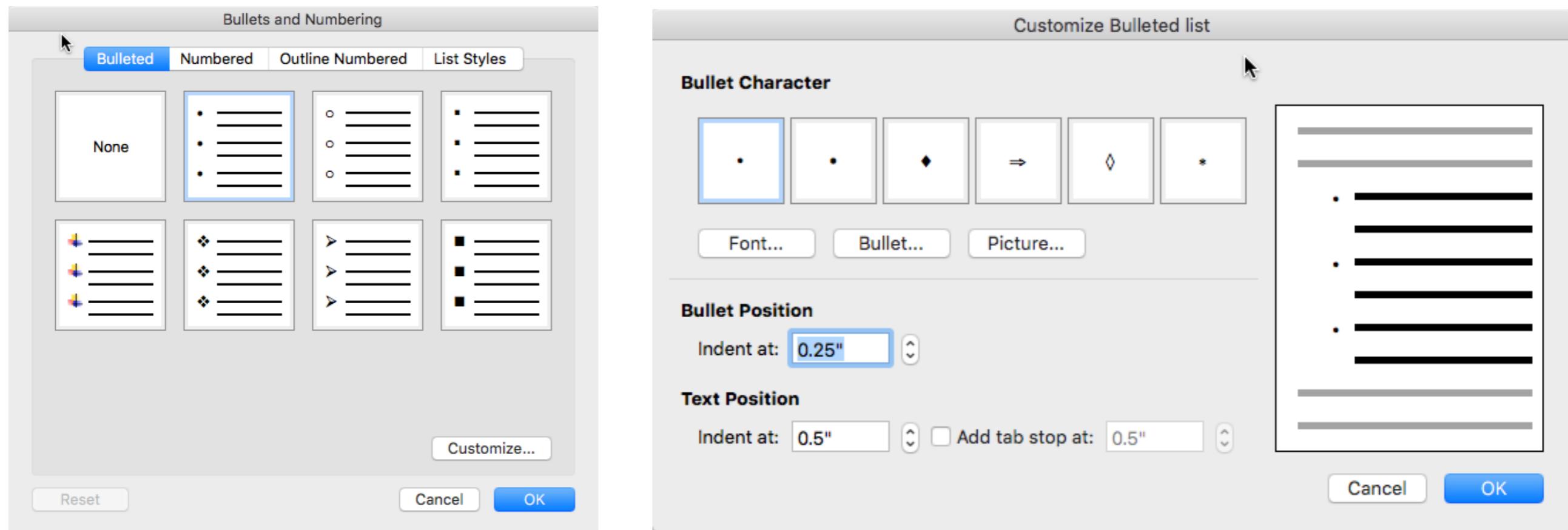
- Interaction flow - the next thing the interface wants to do is exactly what user expects
 - Follow users' mental model
 - Let user direct software
 - Keep all related tools available
- Surprises interrupt interaction flow
- Interfaces should be invisible

Interaction flow guidelines

- Don't use dialogs to report normal behavior
- Separate commands from configuration
- Don't ask questions, give users choices
 - Give users default input, show possible options
- Make dangerous choices hard to reach
- Design for the probable, provide for the possible

Progressive disclosure

- a.k.a. details on demand
- Separate information & commands into layers
- Present most frequently used information & commands first



Metaphors & idioms

Metaphors

- One way to communicate interaction techniques is through metaphors to the real world



Metaphors - advantages

- Leverages understanding of familiar objects & their functions
 - File cabinets, desks, telephones
- Provides **intuitive** understanding of possible affordances & eases mapping tasks to actions
 - Open a folder, throw file in trash, momentum scrolling

Metaphors - disadvantages

- Tyranny of metaphor: ties interactions closely to workings of physical world
- Adds useless overhead in extra steps, wastes visual bandwidth
- Taken literally, becomes non-sensical
 - e.g., nesting folders 10 levels deep



Alternative - Idioms

- A consistent mental model of how something works
 - e.g., Files: open / close / save / save as
- Offers intuitive understanding of affordances & interactions
- Provides consistent vocabulary for describing interactions
- Only have to learn it **once**
- Might have originated in real world, but thought of in terms of mental model for UI interactions

Exercise: Examples of idioms

Examples of idioms

- Email
- Clipboard: cut / copy / paste
- Format painter
- Newsfeed
- Follow item

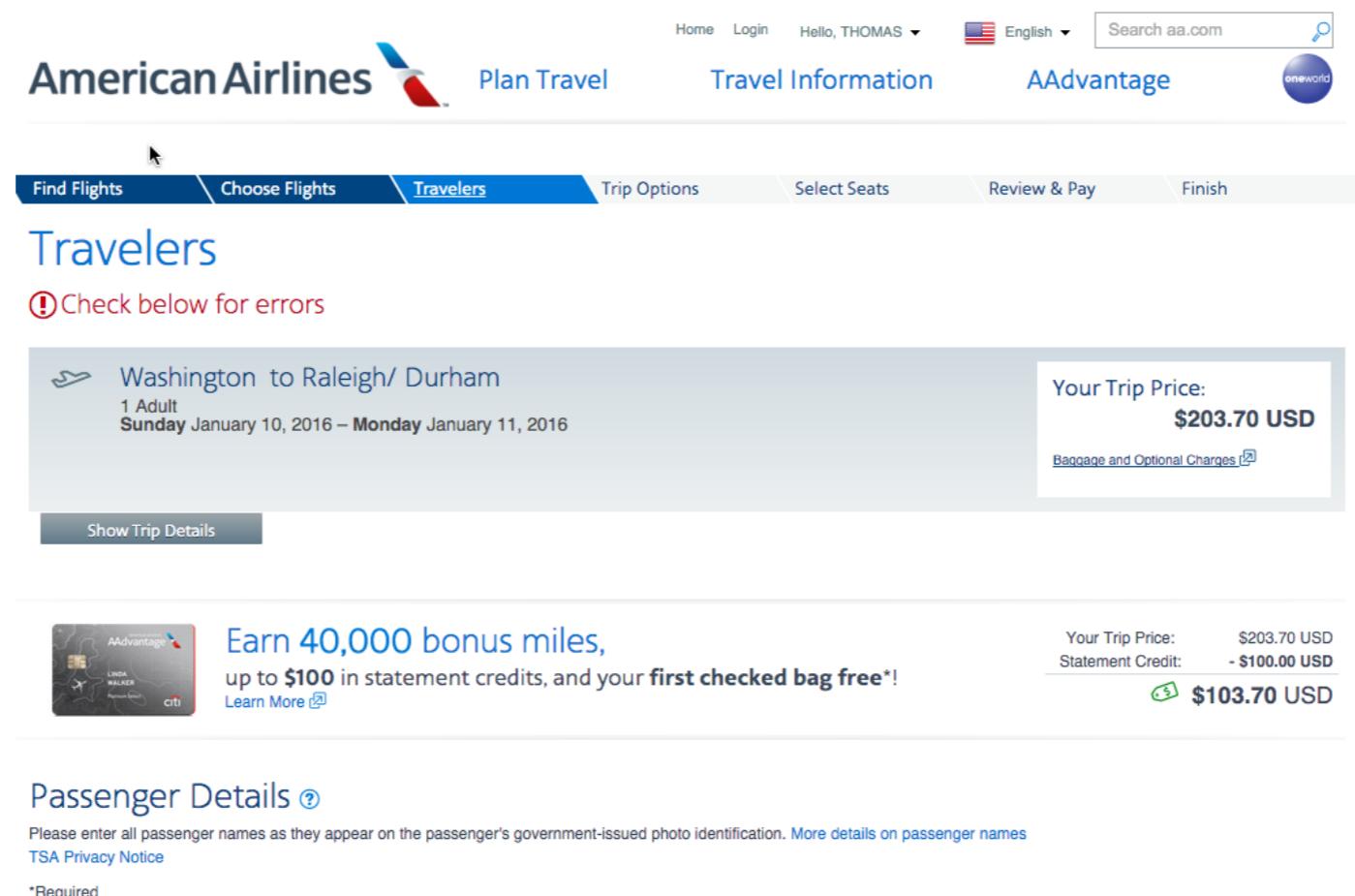
Task Structure

Task structure

- Flow of tasks and task steps
- Task design simplicity, flexibility, efficiency
- Maintenance of locus of control
- Direct manipulation

Separate long tasks into sequences

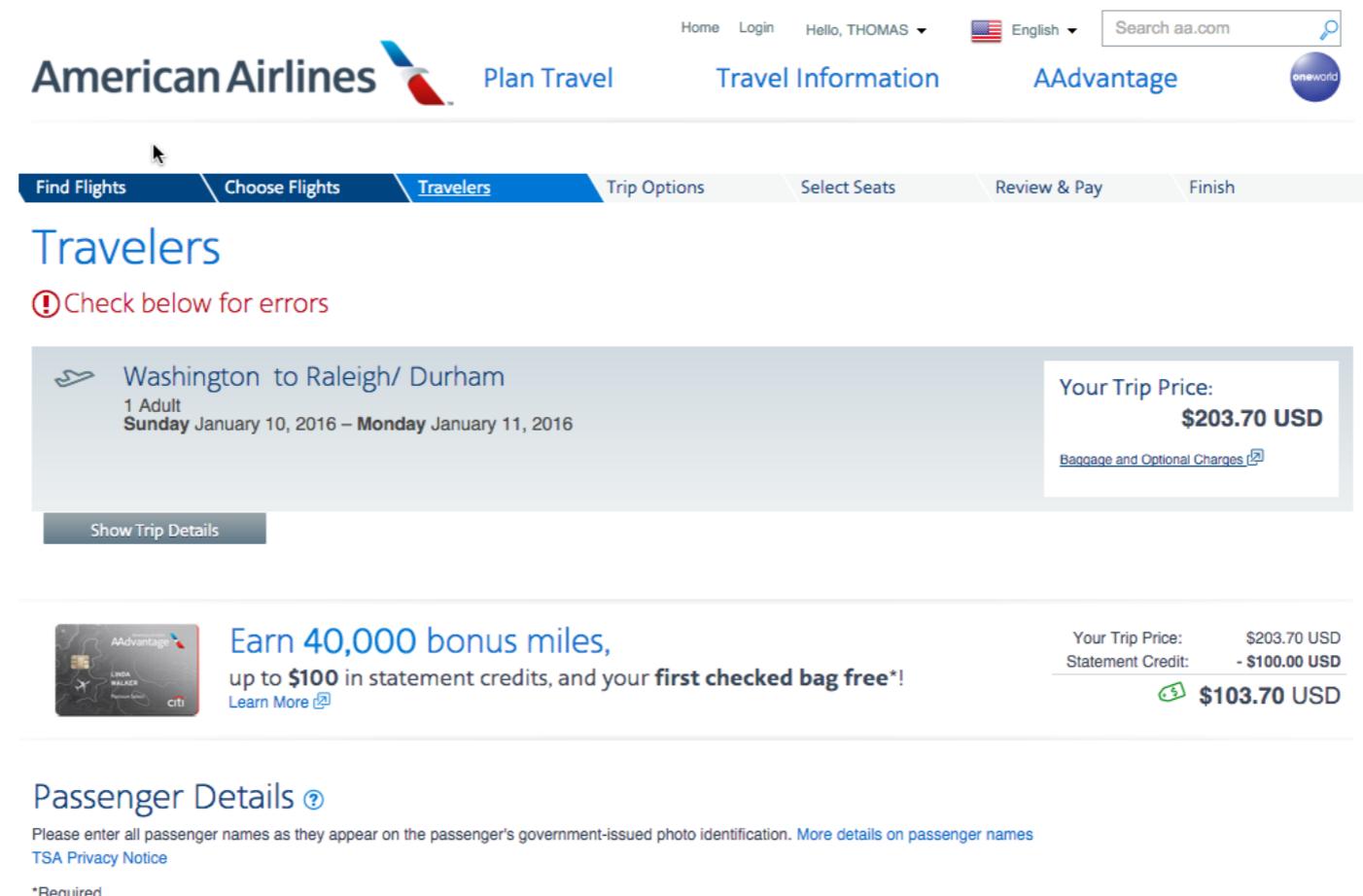
- Reduce short term memory demands by having user only work on one aspect of larger task at a time
- Don't interrupt users in the middle with unrelated tasks
- Provide closure of each subtask at the end



The screenshot shows the American Airlines website interface for booking a flight. The top navigation bar includes links for Home, Login, Hello, THOMAS, English, and a search bar. Below the navigation is a breadcrumb-style navigation bar with steps: Find Flights, Choose Flights, **Travelers**, Trip Options, Select Seats, Review & Pay, and Finish. The main content area is titled "Travelers" and includes a note "Check below for errors". It displays flight details: "Washington to Raleigh/ Durham" for "1 Adult" on "Sunday January 10, 2016 – Monday January 11, 2016". To the right, the "Your Trip Price" is listed as "\$203.70 USD" with a link for "Baggage and Optional Charges". Below this, there's an offer for "AAdvantage" members: "Earn 40,000 bonus miles, up to \$100 in statement credits, and your first checked bag free! Learn More". The "Passenger Details" section at the bottom asks for passenger names, with a note that names must appear on government-issued photo identification. A "Required" asterisk is shown next to the input field. The footer of the page includes links for "TSA Privacy Notice" and "Required".

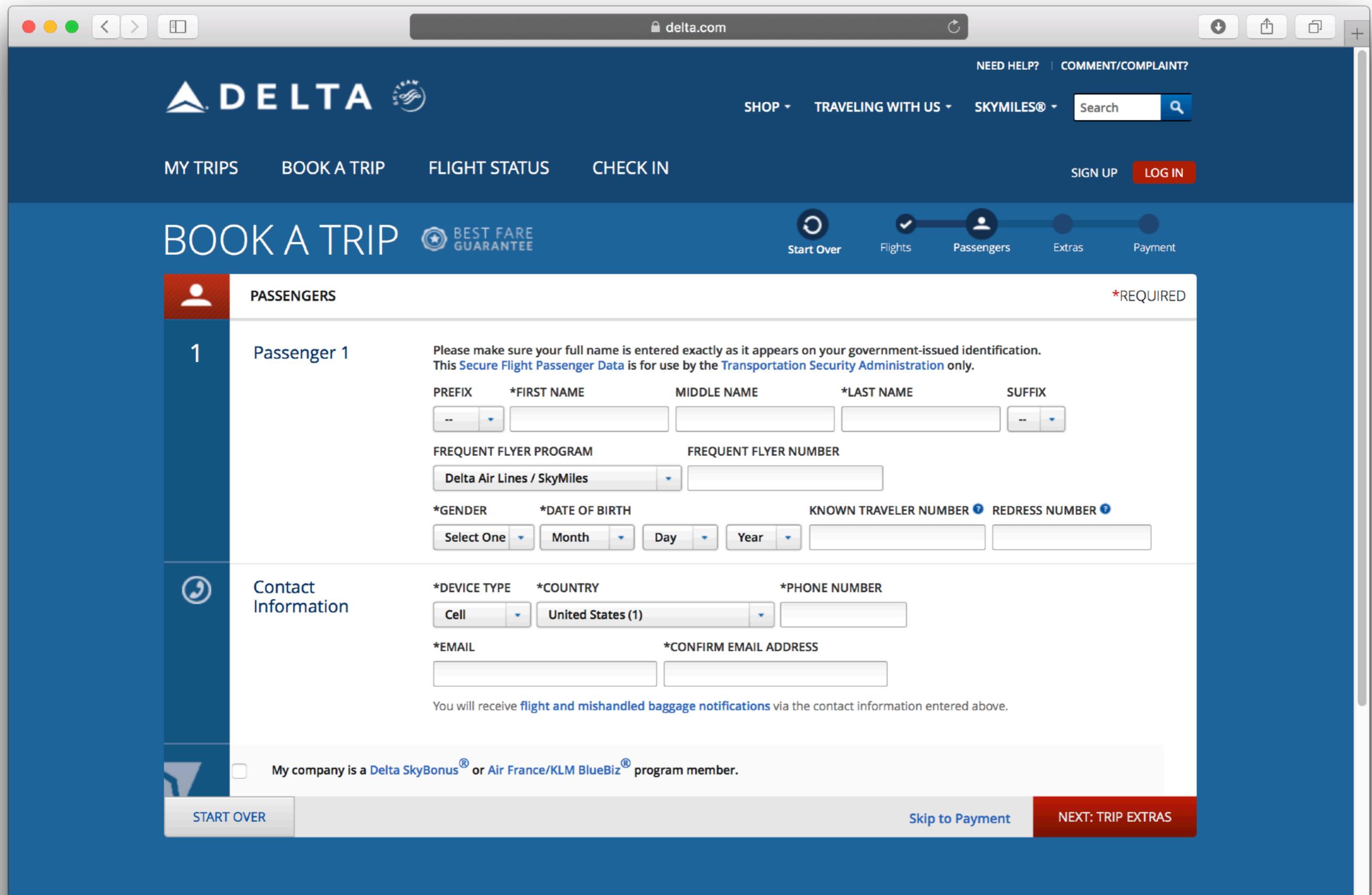
Design for flexibility & efficiency

- Users may take paths never envisioned by designer
- Using studies to identify different task flows, design flexible support for each



The screenshot shows the American Airlines website interface for booking a flight. The top navigation bar includes links for Home, Login, Hello, THOMAS, English, a search bar, and AAdvantage. The main content area is titled 'Travelers' and shows a trip summary: Washington to Raleigh/Durham, 1 Adult, Sunday January 10, 2016 – Monday January 11, 2016. The trip price is listed as \$203.70 USD. Below this, there is an offer for AAdvantage members: 'Earn 40,000 bonus miles, up to \$100 in statement credits, and your first checked bag free*! Learn More'. The passenger details section at the bottom asks for names and includes a note about government-issued photo identification, a link to TSA Privacy Notice, and a required field indicator. The overall design is clean and uses a blue and white color scheme.

Delta: Flight Booking, New User



The screenshot shows the Delta.com website for flight booking. The top navigation bar includes links for 'SHOP', 'TRAVELING WITH US', 'SKYMILES', a 'Search' bar, and 'SIGN UP' and 'LOG IN' buttons. Below the navigation is a 'BOOK A TRIP' section with a 'BEST FAIR GUARANTEE' badge. A progress bar at the top indicates the current step is 'Passenger'. The main form is titled 'PASSENGERS' and shows details for 'Passenger 1'. It includes fields for Prefix, First Name, Middle Name, Last Name, Suffix, Frequent Flyer Program (set to 'Delta Air Lines / SkyMiles'), Frequent Flyer Number, Gender, Date of Birth, Known Traveler Number, Redress Number, Device Type, Country (set to 'United States (1)'), Phone Number, Email, and Confirm Email Address. A note states that notifications will be sent via the entered contact information. A checkbox for company membership in Delta SkyBonus or Air France/KLM BlueBiz is present. At the bottom are 'START OVER', 'Skip to Payment', and 'NEXT: TRIP EXTRAS' buttons.

delta.com

NEED HELP? | COMMENT/COMPLAINT?

DELTA

SHOP | TRAVELING WITH US | SKYMILES® | Search

MY TRIPS | BOOK A TRIP | FLIGHT STATUS | CHECK IN | SIGN UP | LOG IN

BOOK A TRIP | BEST FAIR GUARANTEE

Start Over | Flights | Passengers | Extras | Payment

PASSENGERS

Passenger 1

Please make sure your full name is entered exactly as it appears on your government-issued identification. This [Secure Flight Passenger Data](#) is for use by the [Transportation Security Administration](#) only.

PREFIX *FIRST NAME MIDDLE NAME *LAST NAME SUFFIX

FREQUENT FLYER PROGRAM FREQUENT FLYER NUMBER

Delta Air Lines / SkyMiles

*GENDER *DATE OF BIRTH KNOWN TRAVELER NUMBER ? REDRESS NUMBER ?

Select One Month Day Year

*DEVICE TYPE *COUNTRY *PHONE NUMBER

Cell United States (1)

*EMAIL *CONFIRM EMAIL ADDRESS

You will receive [flight and mishandled baggage notifications](#) via the contact information entered above.

My company is a Delta SkyBonus® or Air France/KLM BlueBiz® program member.

START OVER | Skip to Payment | NEXT: TRIP EXTRAS

Delta: Flight Booking, Existing User

delta.com

NEED HELP? | COMMENT/COMPLAINT?

DELTA 

SHOP | TRAVELING WITH US | SKYMILES® | Search

MY TRIPS | BOOK A TRIP | FLIGHT STATUS | CHECK IN | Jonathan Bell | Start Over | Express Checkout

BOOK A TRIP

 BEST FARE GUARANTEE

FLIGHTS **SKY PRIORITY**

FRI 02 DEC **DCA ▶ ATL**
1:50 PM 3:53 PM

SUN 04 DEC **ATL ▶ DCA**
09:40 AM 11:20 AM

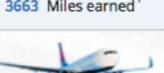
DL 1333 2h 3m | NONSTOP | Main Cabin (K) | Changeable / Nonrefundable | Price per Passenger: \$406⁵¹

DL 1911 1h 40m | NONSTOP | Main Cabin (U) | Changeable / Nonrefundable | Taxes, Fees and Charges: \$58⁵⁹

► Details **Select Seats**

► Details **Select Seats**

1094 Medallion® Qualification Miles (MQMs) earned | 407 Medallion Qualification Dollars (MQDs) earned | [MILEAGE CALCULATOR](#)

 **PAY WITH MILES**

You've selected a Pay With Miles eligible itinerary. Main Cabin tickets purchased using Pay With Miles may not be eligible for Upgrades. Pay with Miles tickets are eligible for mileage accrual for any portion of the base fare or surcharges paid in currency.

YOUR CURRENT MILES BALANCE: 341,312 | MAXIMUM DISCOUNT PER PASSENGER: \$465.20 | **Total Price**: \$465.20 USD

PASSENGERS

Are You Traveling? **YES** **NO**

1 **Passenger Information**



If the full name below is not an exact match to the name on your government-issued identification, [edit your Passenger Info](#). This [Secure Flight Passenger Data](#) is for use by the [Transportation Security Administration Only](#).

PREFIX	FIRST NAME	MIDDLE NAME	LAST NAME	SUFFIX
--	JONATHAN		BELL	--
FREQUENT FLYER PROGRAM		FREQUENT FLYER NUMBER	SKYBONUS/BLUEBIZ NUMBER 	
Delta Air Lines / SkyMiles			--	
GENDER	DATE OF BIRTH	KNOWN TRAVELER NUMBER 	REDRESS NUMBER 	
Male	01/01/1980			

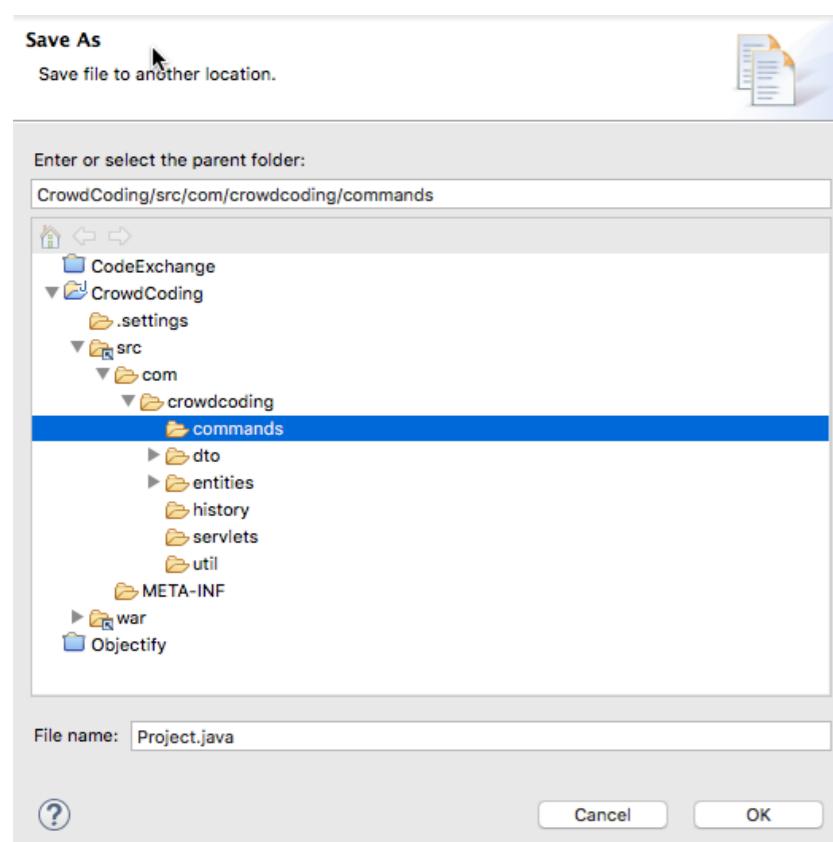
Contact Information

DEVICE TYPE	COUNTRY	PHONE NUMBER
Cell	United States (1)	000-000-0000
EMAIL		

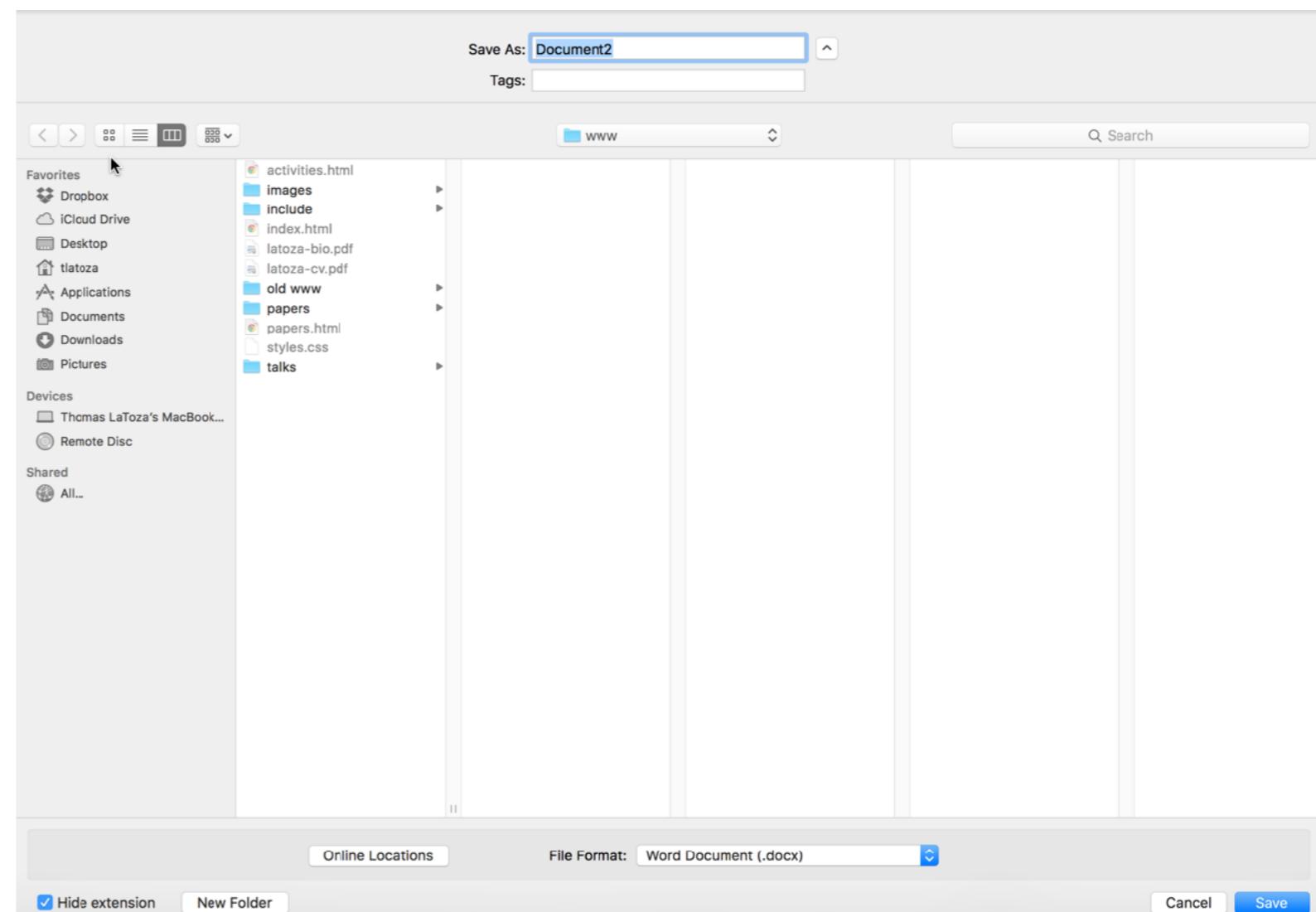
Anticipate likely next actions

- Based on typical observed task flows, surface options for user to take likely next steps

What if folder does not exist?

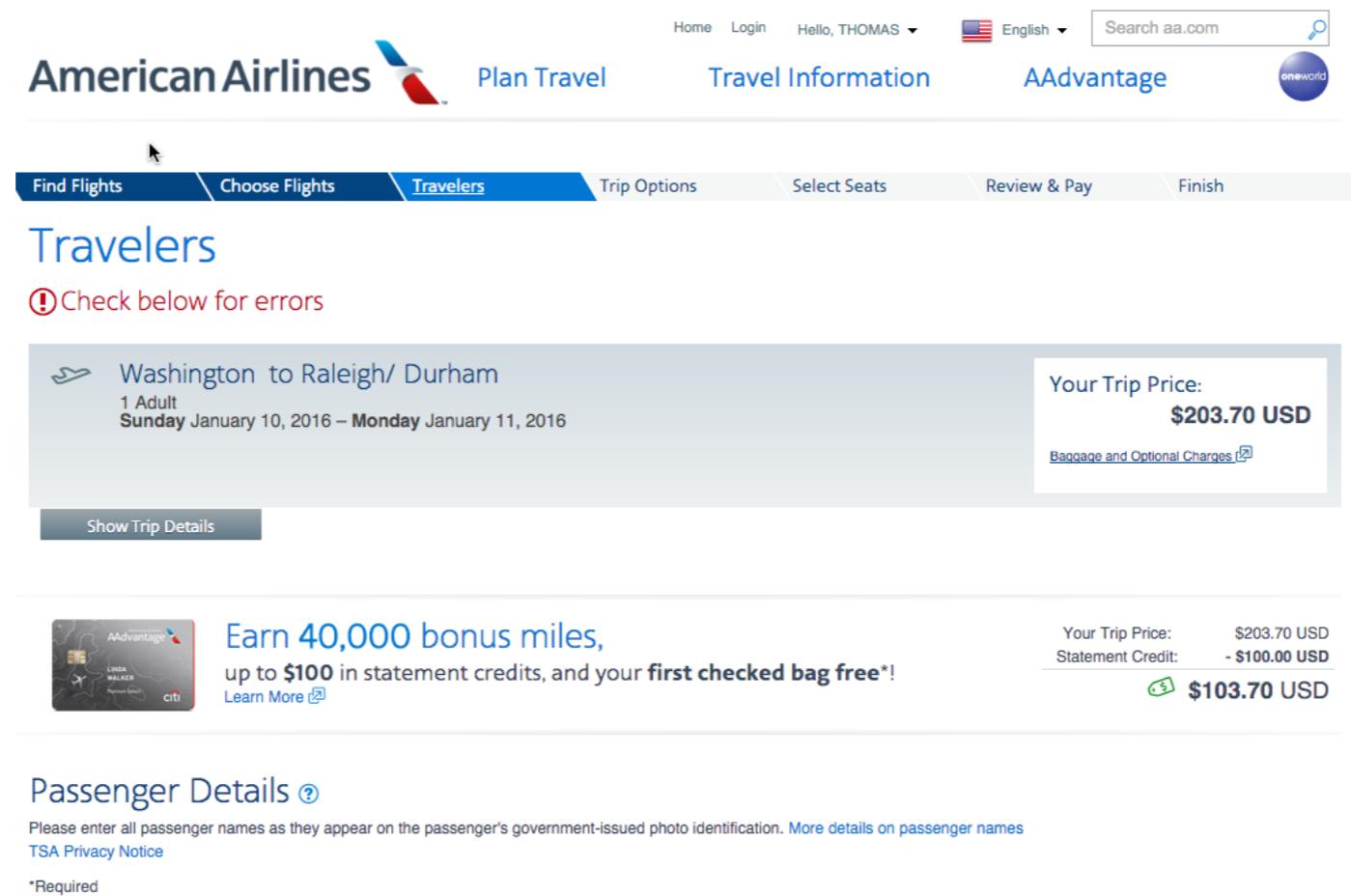


VS.



Keep users in control

- Important users do not feel constrained
- Want users to feel that they can do things the way they want to do them, not as software dictates to them



The screenshot shows the American Airlines website interface during the 'Travelers' step of a flight booking. The top navigation bar includes links for Home, Login, Hello, THOMAS, English, and a search bar. Below the navigation is a horizontal progress bar with steps: Find Flights, Choose Flights, Travelers (which is highlighted in blue), Trip Options, Select Seats, Review & Pay, and Finish. The main content area is titled 'Travelers' and includes a note: 'Check below for errors'. It displays flight details: 'Washington to Raleigh/ Durham', '1 Adult', 'Sunday January 10, 2016 – Monday January 11, 2016'. To the right, the 'Your Trip Price' is listed as '\$203.70 USD'. Below the flight details is a promotional offer: 'Earn 40,000 bonus miles, up to \$100 in statement credits, and your first checked bag free!'. The passenger details section at the bottom asks for names and includes a note: 'Please enter all passenger names as they appear on the passenger's government-issued photo identification. More details on passenger names' and a link to 'TSA Privacy Notice'. A note at the bottom also says: 'Required'.

Navigation

Navigation usability problems

- User can't find desired location
- User loses track of location
- User can't remember information from another location

Navigation

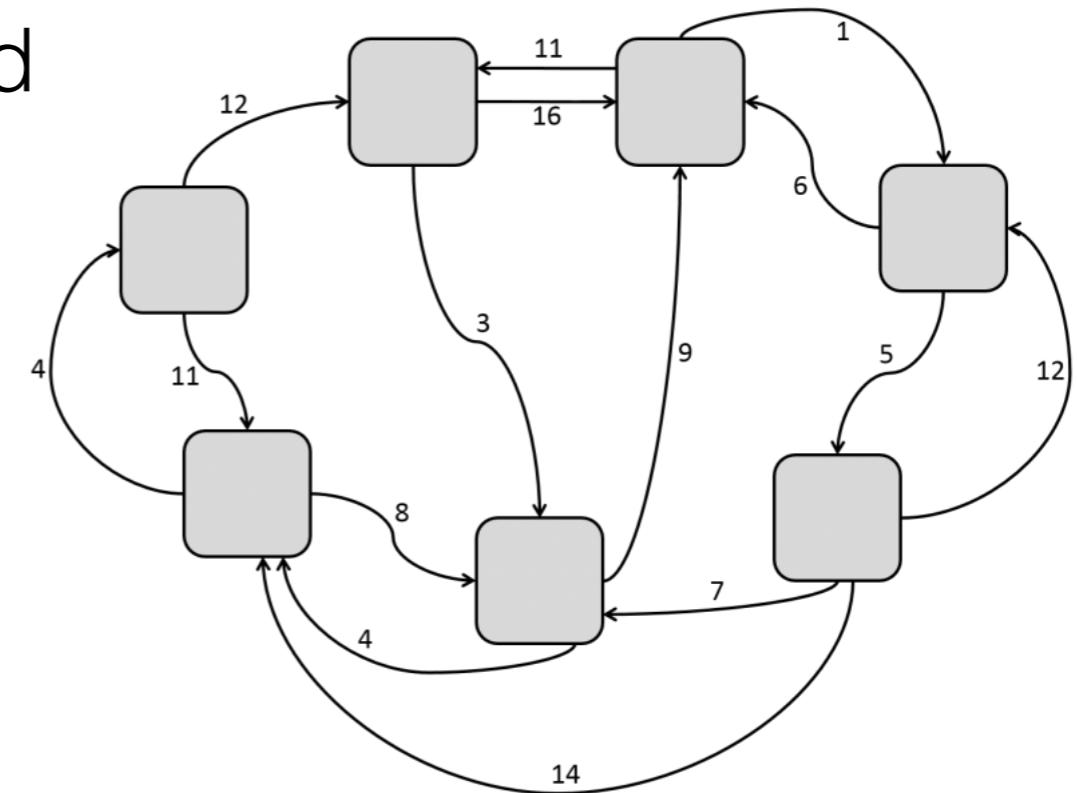
- Many different contexts where navigation is important
 - Among windows & screens
 - Among panes or frames in a window
 - Among tools and menus
 - Within an information space

Information foraging

- Mathematical model describing navigation
- Analogy: animals foraging for food
 - Can forage in different patches (locations)
 - Goal is to maximize chances of finding **prey** while minimizing time spent in hunt
- Information foraging: navigating through an information space (patches) in order to maximize chances of finding prey (information) in minimal time

Information environment

- Information environment represented as **topology**
 - Information patches connected by traversable **links**
- Examples
 - Web pages, connected by links
 - Menu options & dialogs connected by commands
 - Locations on map, connected by search, scroll, move interactions with map



Traversing links

- Links - connection between patch offered by the information environment
- Cues - information features associated with outgoing links from patch
 - E.g., text label on a hyperlink
- User must choose which, of all possible links to traverse, has best chance of reaching prey

Scent

- User interprets cues on links by likelihood they will reach prey
 - e.g., do I think that the “Advanced” options are likely to have the option I’m looking for?

Simplified mathematical model

- Users make choices to maximize **possibility** of reaching prey per cost of interaction
- Predators (idealized) choice = $\max [V / C]$
 - V - value of information gain, C - cost of interaction
- Don't usually know ground truth, have to estimate
- Predator's desired choice = $\max [E[V] / E[C]]$

Some design implications of information foraging theory

- Organize information into functionally **related** groups
- Design effective **cues**, describing what will be found by traversing links
- Match **expectations** of user's mental model
- Provide **search**

Web navigation conventions

NEW & INTERESTING FINDS ON AMAZON **EXPLORE**

amazon Prime

LED & LCD TVs 

BLACK FRIDAY DEALS WEEK

Hello, Thomas Your Account Prime Lists 

Departments Browsing History Thomas's Amazon.com Today's Deals

Televisions & Video Deals Best Sellers Televisions Streaming Media Players Blu-ray Players Home Theater Systems A/V Accessories

1-24 of 147 results for Electronics : Television & Video : Televisions : LED & LCD TVs : "lg tv 4k"

Sort by Relevance 

Show results for

Any Category Electronics Television & Video Televisions **LED & LCD TVs**

Refine by

Delivery Day Get It by Tomorrow

Amazon Prime 

Television Feature Smart TV (132) 3D (53)

Television Resolution 4K Ultra HD (70) 1080p (16) 1080i 760p 760i 720p (1) 720i 480p 480i

SPONSORED BY LG HOME ELECTRONICS

Save on LG Super UHD TVs 

LG Electronics 65UH7700 **LG Electronics 55UH7700** 

Showing most relevant results. See all results for [lg tv 4k](#).

Television Feature: Smart TV | 3D

Sponsored  **LG Electronics 55UH6550 55-Inch 4K Ultra HD Smart LED TV (2016 Model)** by LG Electronics  **\$747⁰⁰** ~~\$897.00~~ 



★★★★★ 25

- Display Size: 55 inches
- Resolution: 4K Ultra HD
- Connectivity Technology: Built-in Wi-Fi
- Display Technology: LED
- Display Resolution Maximum: 4K Ultra HD

Sponsored  **LG Electronics 60UH8500 60-Inch 4K Ultra HD Smart LED TV (2016 Model)** by LG Electronics  **\$1,297⁰⁰** ~~\$1,697.00~~ 



★★★★★ 87

[Electronics Gift Guide](#)

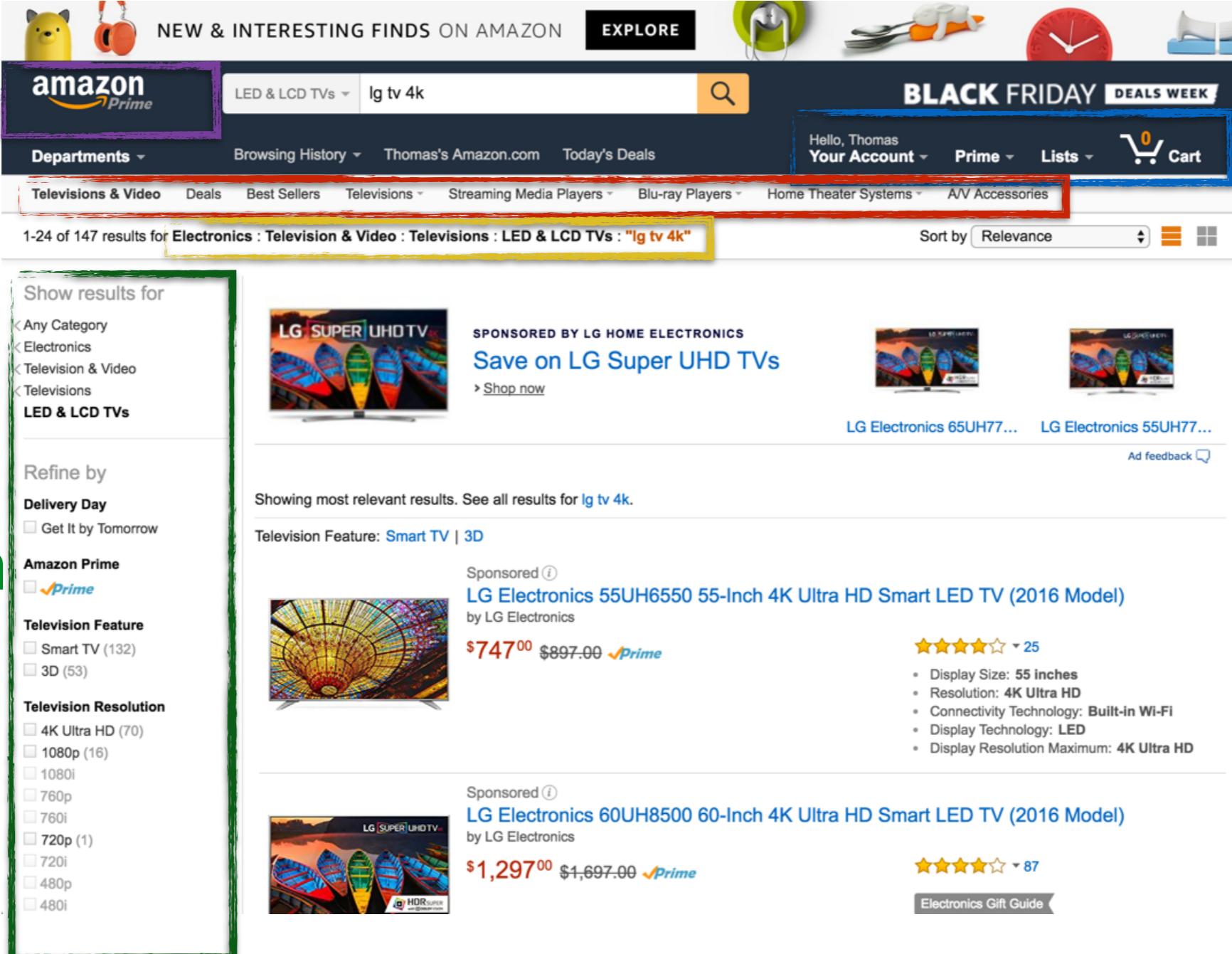
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Web navigation conventions

Site ID

You are here

Local navigation



The screenshot shows the Amazon.com search results for "lg tv 4k". The search bar at the top contains "lg tv 4k". The main content area displays a list of products, starting with a sponsored advertisement for LG Super UHD TVs. The first product listed is the "LG Electronics 55UH6550 55-Inch 4K Ultra HD Smart LED TV (2016 Model)". It is marked as "Sponsored" and shows a price of \$747⁰⁰ (was \$897.00). The product has a 4.5-star rating with 25 reviews. Below this is another sponsored product, the "LG Electronics 60UH8500 60-Inch 4K Ultra HD Smart LED TV (2016 Model)", with a price of \$1,297⁰⁰ (was \$1,697.00) and a 4.5-star rating with 87 reviews. The left sidebar contains a "Show results for" dropdown and various filtering options: "Any Category", "Electronics", "Television & Video", "Televisions", and "LED & LCD TVs". It also includes sections for "Refine by" with "Delivery Day" (Get It by Tomorrow), "Amazon Prime" (Prime), "Television Feature" (Smart TV, 3D), and "Television Resolution" (4K Ultra HD, 1080p, 1080i, 760p, 760i, 720p, 720i, 480p, 480i).

Utilities
Sections

Footer
navigation

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Persistent navigation

- Forms a common idiom users already understand
- Gives instant confirmation that still on the same site
- Supports consistency and standards
 - If *all* of your pages function same way, users know how to do actions & what to expect
 - Ok for specialized page like forms that are clearly different to not follow conventions.

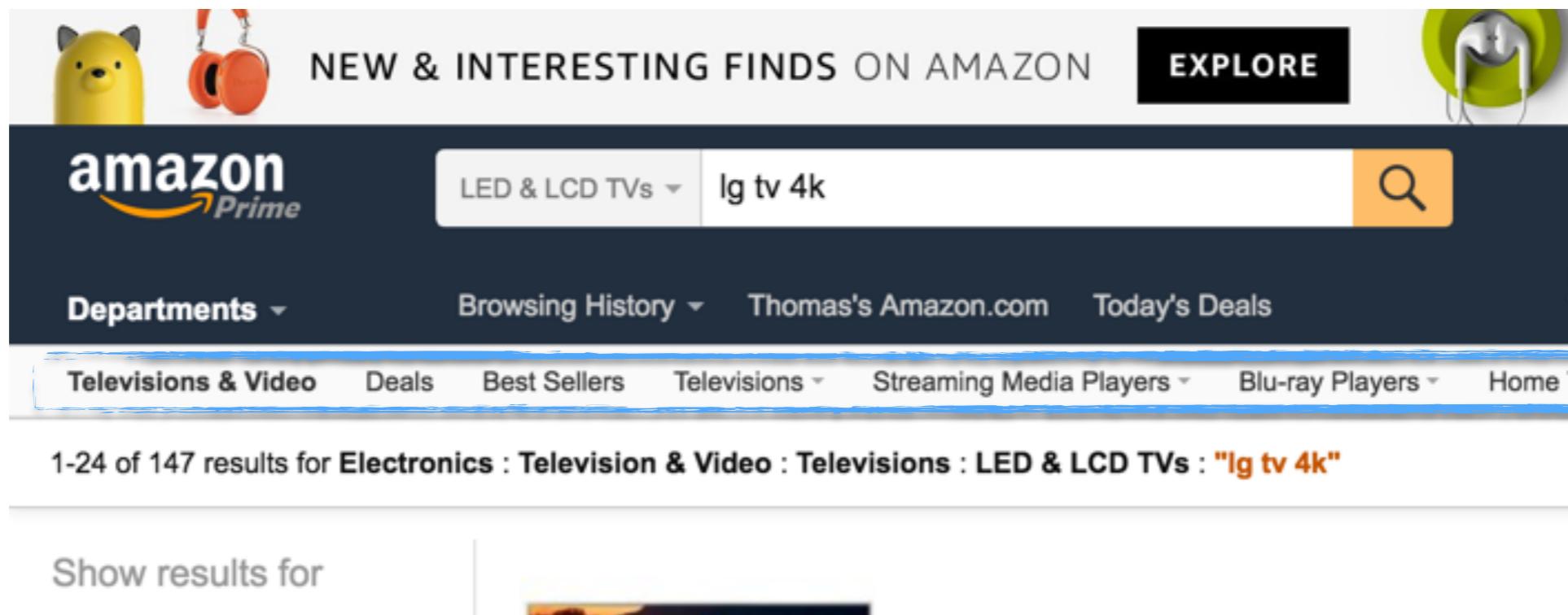
Breadcrumbs

- Offer trail of where the user has been and how they got there
- Shows hierarchy of information space
- Shows current location

The screenshot shows the Amazon search results for "lg tv 4k". The search bar at the top contains "lg tv 4k". The breadcrumb trail in the header shows: NEW & INTERESTING FINDS ON AMAZON > EXPLORE > BLACK FRIDAY > DEALS WEEK > Departments > Browsing History > Thomas's Amazon.com > Today's Deals. The main search results page displays 1-24 of 147 results for Electronics: Television & Video: Televisions: LED & LCD TVs: "lg tv 4k". The results are sponsored by LG Home Electronics, showing two LG Super UHD TVs (65UH77 and 55UH77) and an LG Electronics 55UH6550 55-Inch 4K Ultra HD Smart LED TV (2016 Model). The LG Super UHD TVs are shown with a yellow bounding box around the category path in the breadcrumb trail. The LG Electronics 55UH6550 is shown with a yellow bounding box around the search term "lg tv 4k". The results are sorted by Relevance. The page also includes a sidebar for refining results by category, delivery day, Amazon Prime, television feature, and resolution.

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Tabs



- Example of a metaphor: tab dividers in a three ring binder or folders in a file drawer
- Partition into sections
- Advantages
 - Easily understood and self-evident
 - (Usually) hard to miss

Questions for a good site design

- Answers to the following should be obvious for a good site design
 - What site is this? (Site ID)
 - What page am I on? (Page name)
 - What are the major sections of this site? (Sections)
 - What are my options at this level? (Local navigation)
 - Where am I in the site? (“You are here” indicators)
 - How can I search?

In Class Activity: Design a course catalog & registration system

- In groups of 2 or 3
 - Design a course catalog & registration system
 - Create sketches showing key screens
 - Should support
 - browsing course catalog, registering for classes, waitlists
 - building plan of courses to take over multiple semesters to fulfill degree requirements