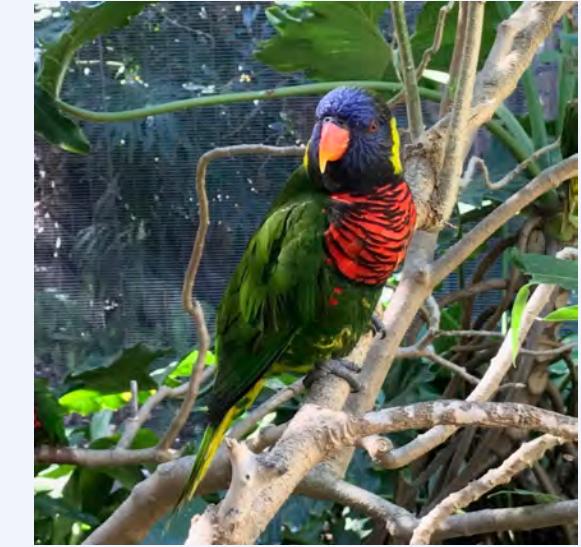


Welcome

The Interaction Design Fundamentals

“Wonder is the feeling of the philosopher, and philosophy begins in wonder.”

Plato



The Interaction Design Fundamentals

Abbas Moallem, Ph.D.

Session 4



CONCEPTUALIZING INTERACTION





Problem Space

Problem Space refers to the entire range of components that exist in the process of finding a solution to a problem.



Understanding the Problem Space

- **What do you want to create?**
- **What are your assumptions?**
- **Will it achieve what you hope it will?**



A framework for analysing the problem space

- Are there problems with an existing product or user experience? If so, what are they?
- Why do you think there are problems?
- How do you think your proposed design ideas might overcome these?
- If you are designing for a new user experience how do you think your proposed design ideas support, change, or extend current ways of doing things?



From Problem Space to Design Space

- Having a good understanding of the problem space can help inform the design space
 - e.g. what kind of interface, behaviour, functionality to provide
- But before deciding upon these it is important to develop a conceptual model



Conceptual model

- A conceptual model is:
 - “...a high-level description of how a system is organized and operates” (Johnson and Henderson, 2002, p26)
- Enables
 - “...designers to straighten out their thinking before they start laying out their widgets”
(Johnson and Henderson, 2002, p28)



Benefits of Conceptualising

- Orientation
 - enables design teams to ask specific questions about how the conceptual model will be understood
- Open-minded
 - prevents design teams from becoming narrowly focused early on
- Common ground
 - allows design teams to establish a set of commonly agreed terms



Conceptual models

- Many kinds and ways of classifying them
- We describe them in terms of core activities and objects
- Also in terms of interface metaphors



Which conceptual model is best?

- Direct manipulation is good for ‘doing’ types of tasks, e.g. designing, drawing, flying, driving, sizing windows
- Issuing instructions is good for repetitive tasks, e.g. spell-checking, file management
- Having a conversation is good for children, computer-phobic, disabled users and specialised applications (e.g. phone services)
- Hybrid conceptual models are often employed, where different ways of carrying out the same actions is supported at the interface - but can take longer to learn



Conceptual models: Interaction and Interface

- **Interaction type:**
 - what the user is doing when interacting with a system,
e.g. instructing, talking, browsing or other
- **Interface type:**
 - the kind of interface used to support the mode, e.g.
speech, menu-based, gesture

METAPHORS





Metaphor

- **a figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable.**
- **A metaphor is a figure of speech that refers, for rhetorical effect, to one thing by mentioning another thing. It may provide clarity or identify hidden similarities between two ideas. Where a simile compares two items, a metaphor directly equates them, and does not use "like" or "as" as does a simile**
- **<https://en.wikipedia.org/wiki/Metaphor>**



Metaphor

- Relating computing to other real-world activity is effective teaching technique
 - word processing as typing
 - financial analysis on spreadsheets
 - virtual reality – user inside the metaphor
- Problems
 - some tasks do not fit into a given metaphor
 - cultural bias

Metaphors	Examples
Settings are gears	“Turn on a setting”
Internet is up	“Upload a file,” “Save to the <i>cloud</i> ”
Computers are offices	“Files and <i>folders</i> on your <i>desktop</i> ”
Applications are vehicles	“Run a program,” “Crash an app”
Forums are boards	“Post on a forum,” “Pin to a <i>board</i> ”
Websites are books	“Bookmark a webpage,” “Publish a site”
Websites are homes	“Go to the <i>homepage</i> ,” “Sign in as a <i>guest</i> ”



Interface Metaphors

- Conceptualizing what we are doing, e.g. surfing the web
- A conceptual model instantiated at the interface, e.g. the desktop metaphor
- Visualizing an operation, e.g. an icon of a shopping cart for placing items into



Interface Metaphors

- Interface designed to be similar to a physical entity but also has own properties
 - e.g. desktop metaphor, web portals
- Can be based on activity, object or a combination of both
- Exploit user's familiar knowledge, helping them to understand 'the unfamiliar'
- Conjures up the essence of the unfamiliar activity, enabling users to leverage of this to understand more aspects of the unfamiliar functionality



Material Metaphors

- The card is a very popular UI
- Why?: Has familiar form factor
- Material properties are added, giving appearance and physical behavior, e.g. surface of paper

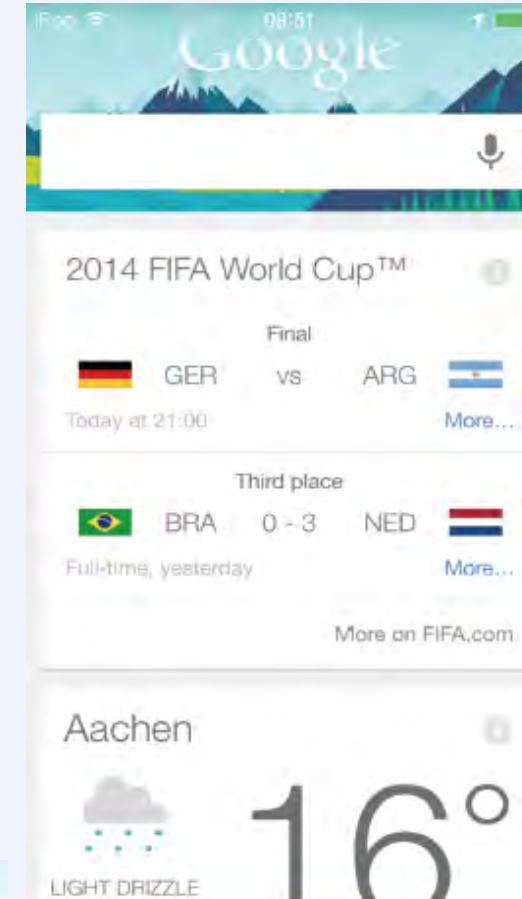


Figure 2.5 Google Now Card

Source: Google and the Google logo are registered trademarks of Google Inc., used with permission.
<http://www.google.com/design/spec/material-design/introduction.html>



Benefits of Interface Metaphors

- Makes learning new systems easier
- Helps users understand the underlying conceptual model
- Can be very innovative and enable the realm of computers and their applications to be made more accessible to a greater diversity of users



Problems with Interface Metaphors

- Break conventional and cultural rules
 - e.g. recycle bin placed on desktop
- Can constrain designers in the way they conceptualize a problem space
- Conflict with design principles
- Forces users to only understand the system in terms of the metaphor
- Designers can inadvertently use bad existing designs and transfer the bad parts over
- Limits designers' imagination in coming up with new conceptual models

PARADIGM





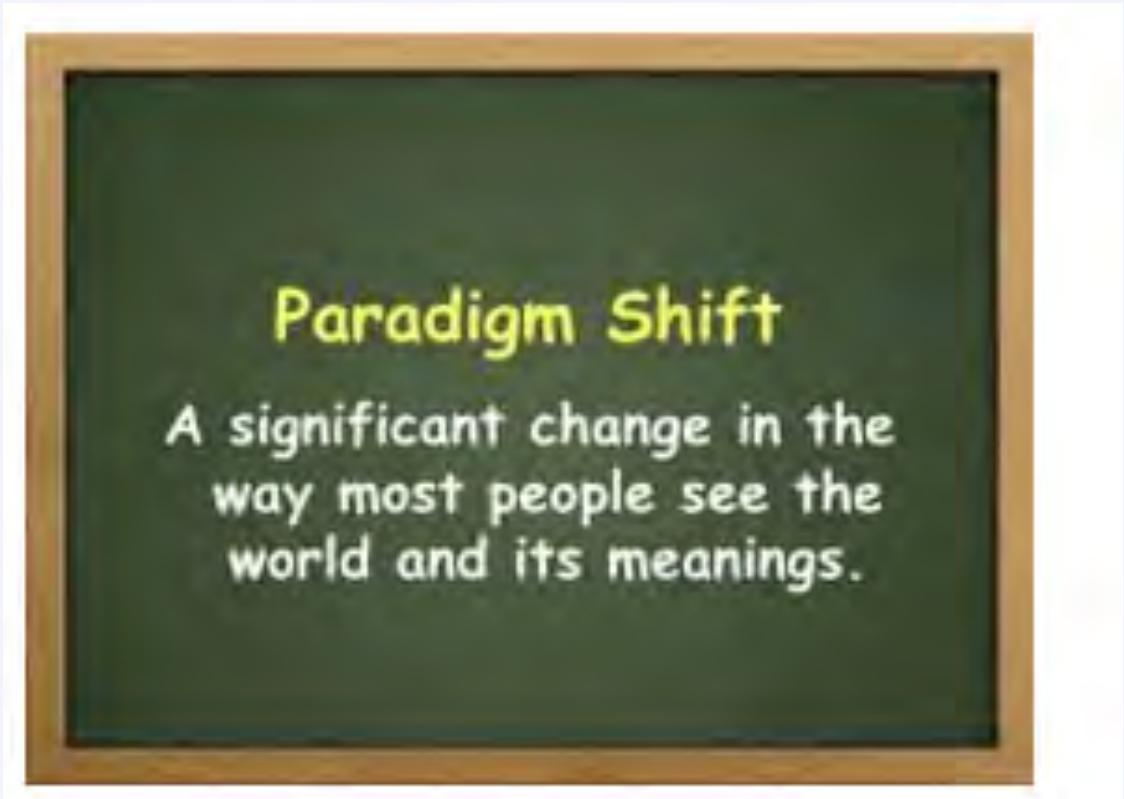
Paradigm

- Inspiration for a conceptual model
- General approach adopted by a community for carrying out research
 - shared assumptions, concepts, values, and practices
 - e.g. desktop, ubiquitous computing, in the wild



Definition of Paradigm

- a model of something
- a pattern or model
- a typical or stereotypical





Why Study Paradigms

Concerns

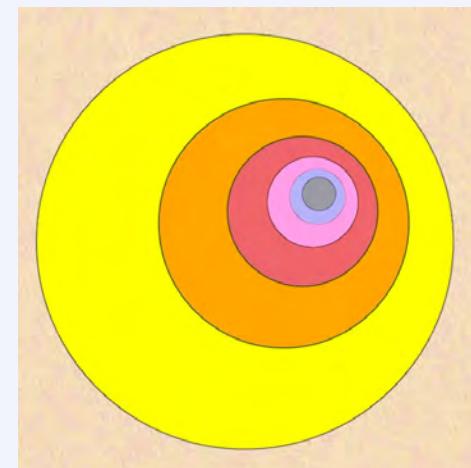
- how can an interactive system be developed to ensure its usability?
- how can the usability of an interactive system be demonstrated or measured?

History of interactive system design provides paradigms for usable designs



What are Paradigms

- Predominant theoretical frameworks or scientific world views
 - e.g., Aristotelian, Newtonian, Einsteinian (relativistic) paradigms in physics
- Understanding HCI history is largely about understanding a series of paradigm shifts
 - Not all listed here are necessarily “paradigm” shifts, but are at least candidates
 - History will judge which are true shifts





Examples of New Paradigms

- Ubiquitous computing (mother of them all)
- Pervasive computing
- Wearable computing
- Tangible bits, augmented reality
- Attentive environments
- Transparent computing
 - and many more....



Ubiquitous Computing

“The most profound technologies are those that disappear.”

Mark Weiser, 1991

Late 1980's: computer was very apparent

How to make it disappear?

- Shrink and embed/distribute it in the physical world
- Design interactions that don't demand our intention



Agent-based Interfaces

- Original interfaces
 - Commands given to computer
 - Language-based
- Direct Manipulation/WIMP
 - Commands performed on “world” representation
 - Action based
- Agents - return to language by instilling proactivity and “intelligence” in command processor
 - Avatars, natural language processing

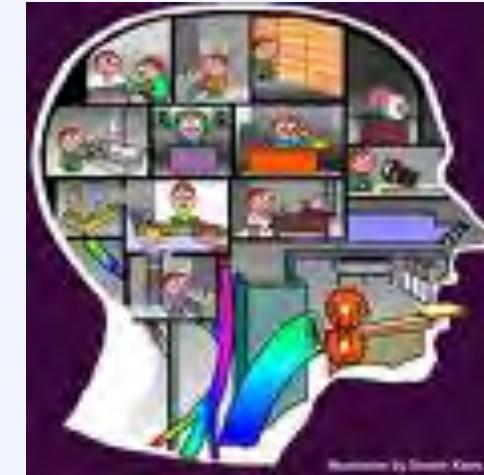


Computer Supported Cooperative Work (CSCW)

- CSCW removes bias of single user / single computer system
- Can no longer neglect the social aspects
- Electronic mail is most prominent success

Sensor-based and Context-aware Interaction

- Humans are good at recognizing the “context” of a situation and reacting appropriately
- Automatically sensing physical phenomena (e.g., light, temp, location, identity) becoming easier
- How can we go from sensed physical measures to interactions that behave as if made “aware” of the surroundings?





Multimodality

- **a mode is a human communication channel**
- **emphasis on simultaneous use of multiple channels for input and output**

EMOTION





Emotion

- The biological response to physical stimuli is called **affect**
- Affect influences how we respond to situations
 - positive → creative problem solving
 - negative → narrow thinking

“Negative affect can make it harder to do even easy tasks; positive affect can make it easier to do difficult tasks”

(Donald Norman)





Emotion

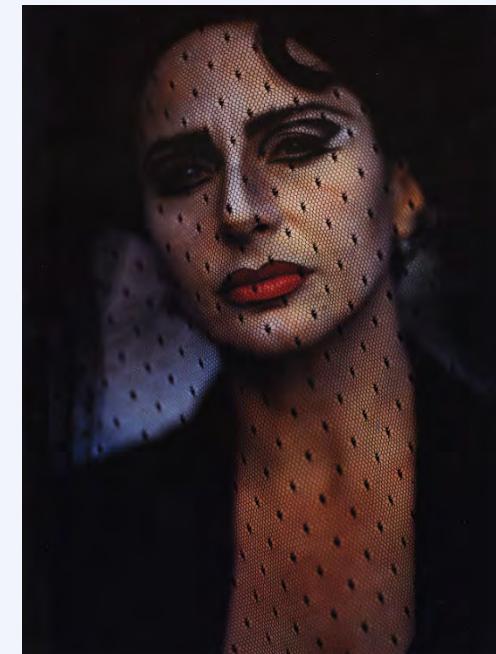
- Various theories of how emotion works
 - James-Lange: emotion is our interpretation of a physiological response to a stimuli
 - Cannon: emotion is a psychological response to a stimuli
 - Schacter-Singer: emotion is the result of our evaluation of our physiological responses, in the light of the whole situation we are in
- Emotion clearly involves both cognitive and physical responses to stimuli





Emotion

- Implications for interface design
 - stress will increase the difficulty of problem solving
 - relaxed users will be more forgiving of shortcomings in design
 - aesthetically pleasing and rewarding interfaces will increase positive affect





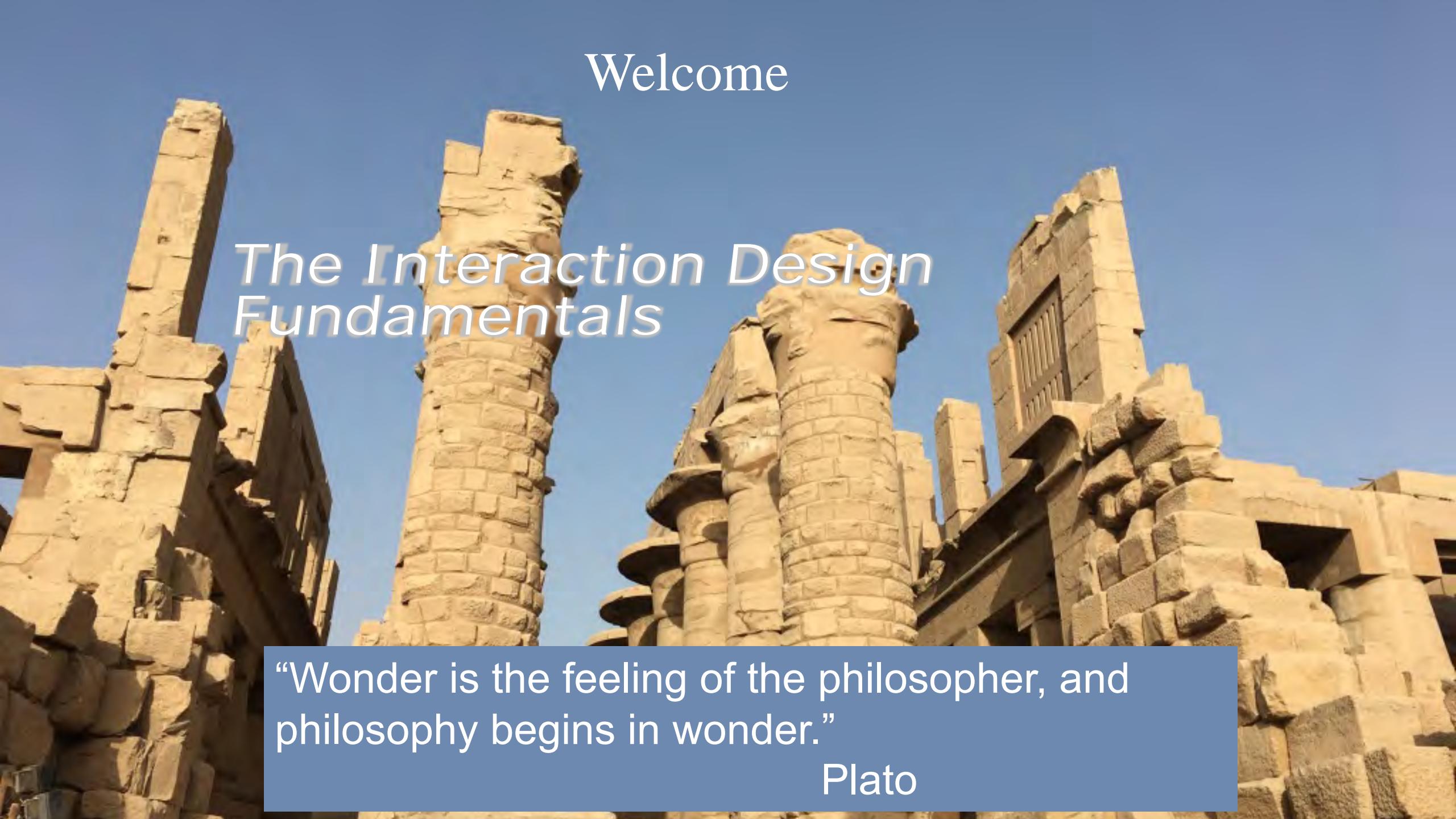
Questions





See You Next Week

Thank You For Your Participation

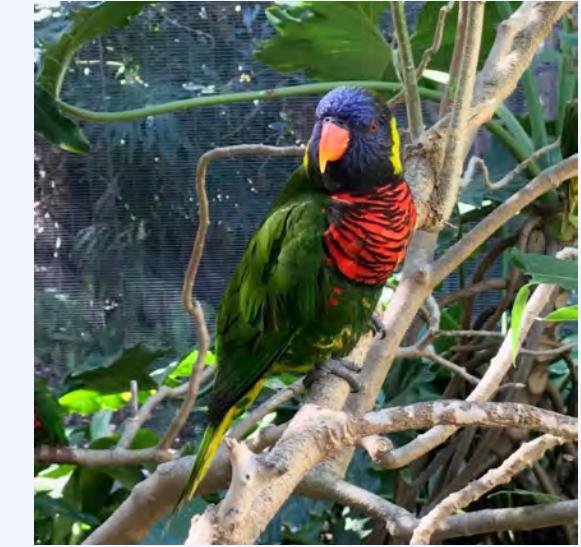


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INTERACTION TYPES



Interaction Types

- **Instructing**
 - issuing commands and selecting options
- **Conversing**
 - interacting with a system as if having a conversation
- **Manipulating**
 - interacting with objects in a virtual or physical space by manipulating them
- **Exploring**
 - moving through a virtual environment or a physical space
- **Responding**
 - Where the system initiates the interaction and the user chooses whether to respond.



Instructing

- Where users instruct a system and tell it what to do
 - e.g. tell the time, print a file, save a file
- Very common conceptual model, underlying a diversity of devices and systems
 - e.g. word processors, VCRs, vending machines
- Main benefit is that instructing supports quick and efficient interaction
 - good for repetitive kinds of actions performed on multiple objects



Conversing

- Underlying model of having a conversation with another human
- Range from simple voice recognition menu-driven systems to more complex ‘natural language’ dialogs
- Examples include timetables, search engines, advice-giving systems, help systems
- Also virtual agents, toys and pet robots designed to converse with you

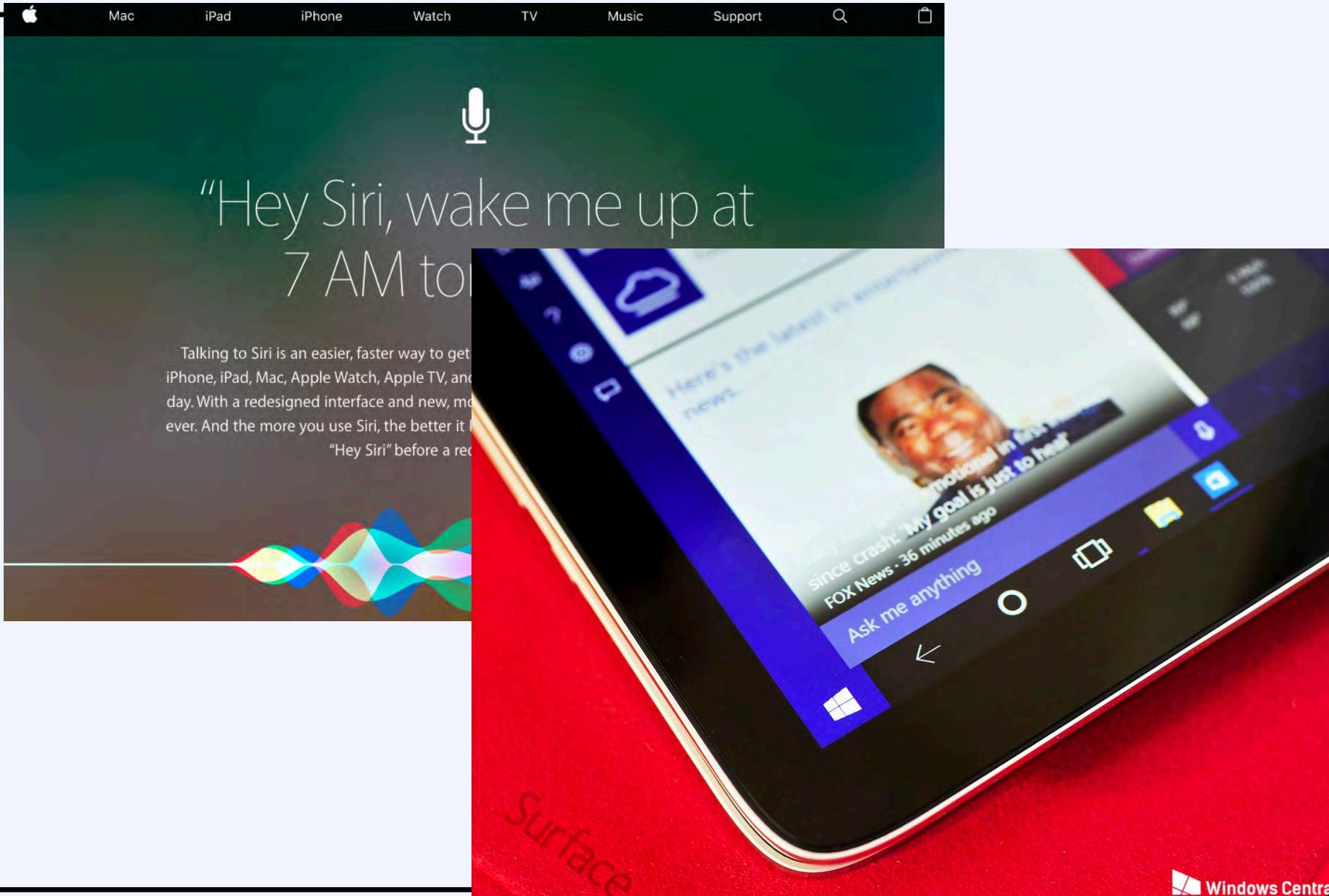


Conversational model

- Allows users, especially novices and technophobes, to interact with the system in a way that is familiar
 - makes them feel comfortable, at ease and less scared
- Misunderstandings can arise when the system does not know how to parse what the user says



Would you talk with Siri?





Manipulating

Interacting with objects in a virtual or physical space by manipulating them



Why are DM interfaces so enjoyable?

- Novices can learn the basic functionality quickly
- Experienced users can work extremely rapidly to carry out a wide range of tasks, even defining new functions
- Intermittent users can retain operational concepts over time
- Error messages rarely needed
- Users can immediately see if their actions are furthering their goals and if not do something else
- Users experience less anxiety
- Users gain confidence and mastery and feel in control



What are the disadvantages with DM?

- Some people take the metaphor of direct manipulation too literally
- Not all tasks can be described by objects and not all actions can be done directly
- Some tasks are better achieved through delegating
 - e.g. spell checking
- Can become screen space ‘gobblers’
- Moving a mouse around the screen can be slower than pressing function keys to do same actions



Exploring

- Involves users moving through virtual or physical environments
- Physical environments with embedded sensor technologies
 - Context aware



Responding

- Where the system initiates the interaction and the user chooses whether to respond.

A FEW MORE DESIGN RULES





Visibility

"The system should always keep users informed about what is going on, through appropriate feedback within reasonable time."



Visibility

- This is a control panel for an elevator
- How does it work?
- Push a button for the floor you want?
- Nothing happens. Push any other button? Still nothing. What do you need to do?
- It is not visible as to what to do!





Consistency

- Design interfaces to have similar operations and use similar elements for similar tasks
- For example:
 - always use ctrl key plus first initial of the command for an operation
 - `ctrl+C`, `ctrl+S`, `ctrl+O`
- Main benefit is consistent interfaces are easier to learn and use



When consistency breaks down

- What happens if there is more than one command starting with the same letter?
 - e.g. save, spelling, select, style
- Have to find other initials or combinations of keys, thereby breaking the consistency rule
 - e.g. ctrl+S, ctrl+Sp, ctrl+shift+L
- Increases learning burden on user, making them more prone to errors

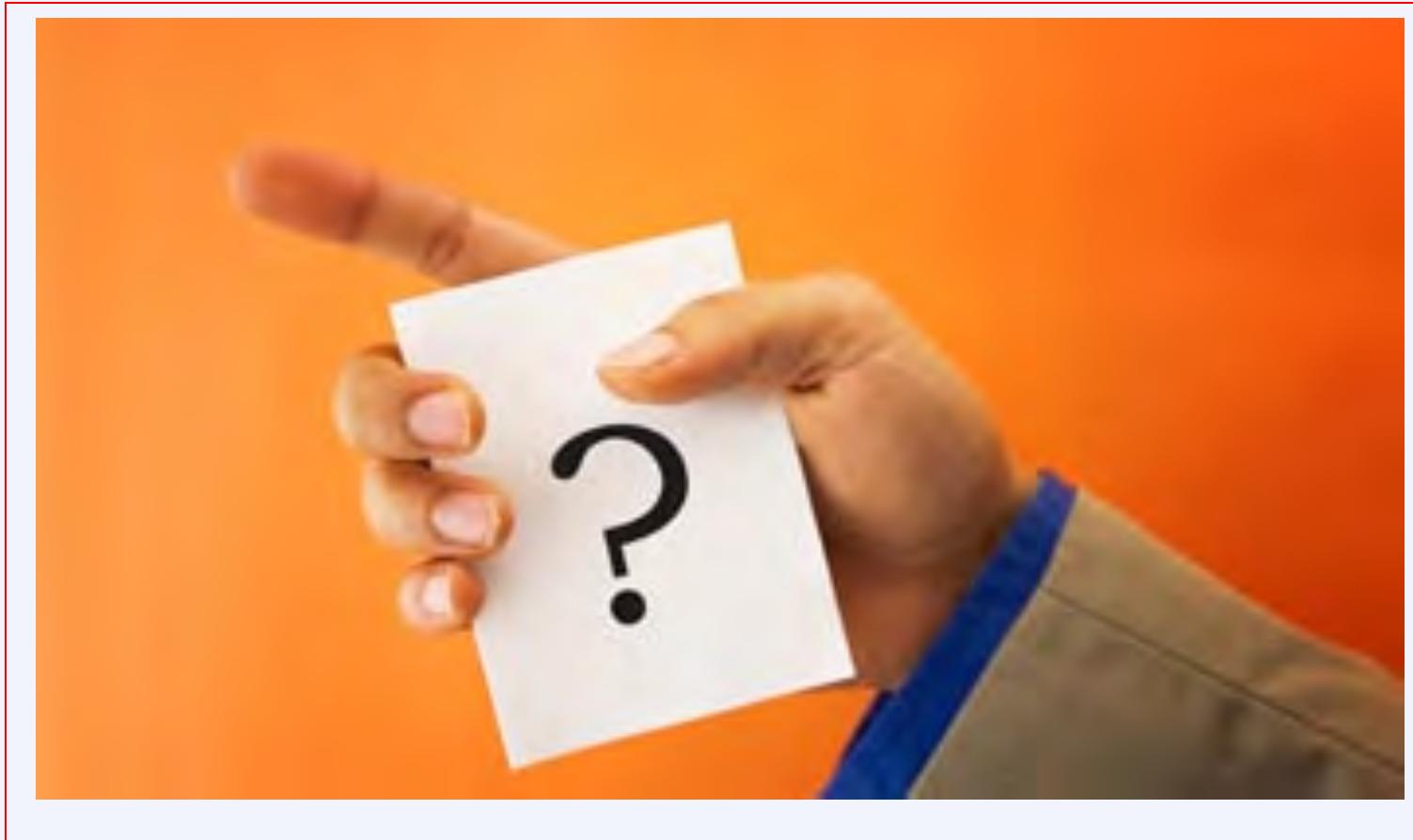


Internal and External Consistency

- Internal consistency refers to designing operations to behave the same within an application
 - Difficult to achieve with complex interfaces
- External consistency refers to designing operations, interfaces, etc., to be the same across applications and devices
 - Very rarely the case, based on different designer's preference



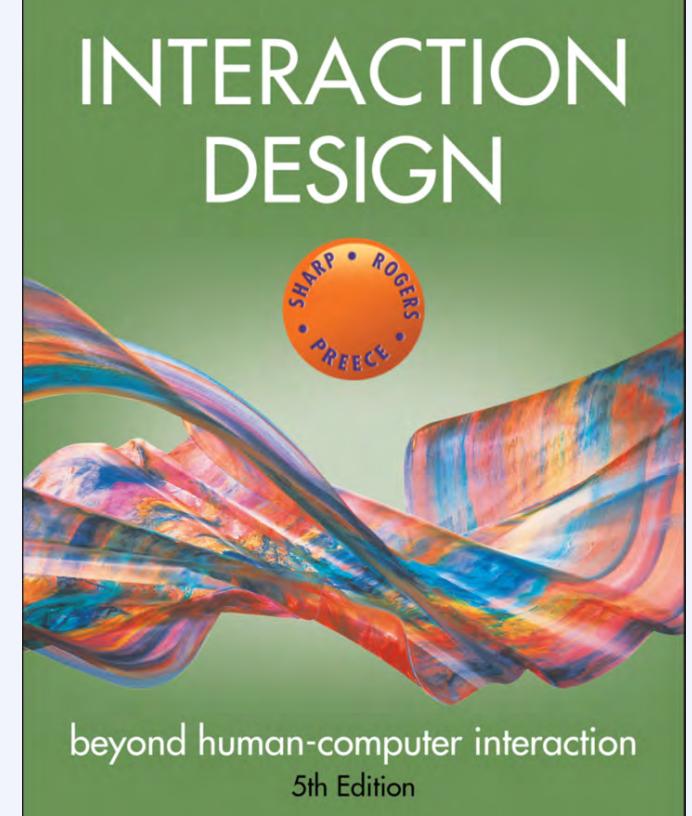
Questions





Reading Assignments

- Chapter 1: What is Interaction Design? Page 1-35
- Chapter 3: Conceptualizing Interaction- Page 69-97





See You Next Week

Thank You For Your Participation

Welcome

Common Interaction Styles:

- *Question/answer and query dialogue*
- *Form-fills and spreadsheets*

Abbas Moallem, Ph.D.

Among the great things which are to be found among us, the Being of Nothingness is the greatest

Leonardo Da Vinci



Common Interaction Styles

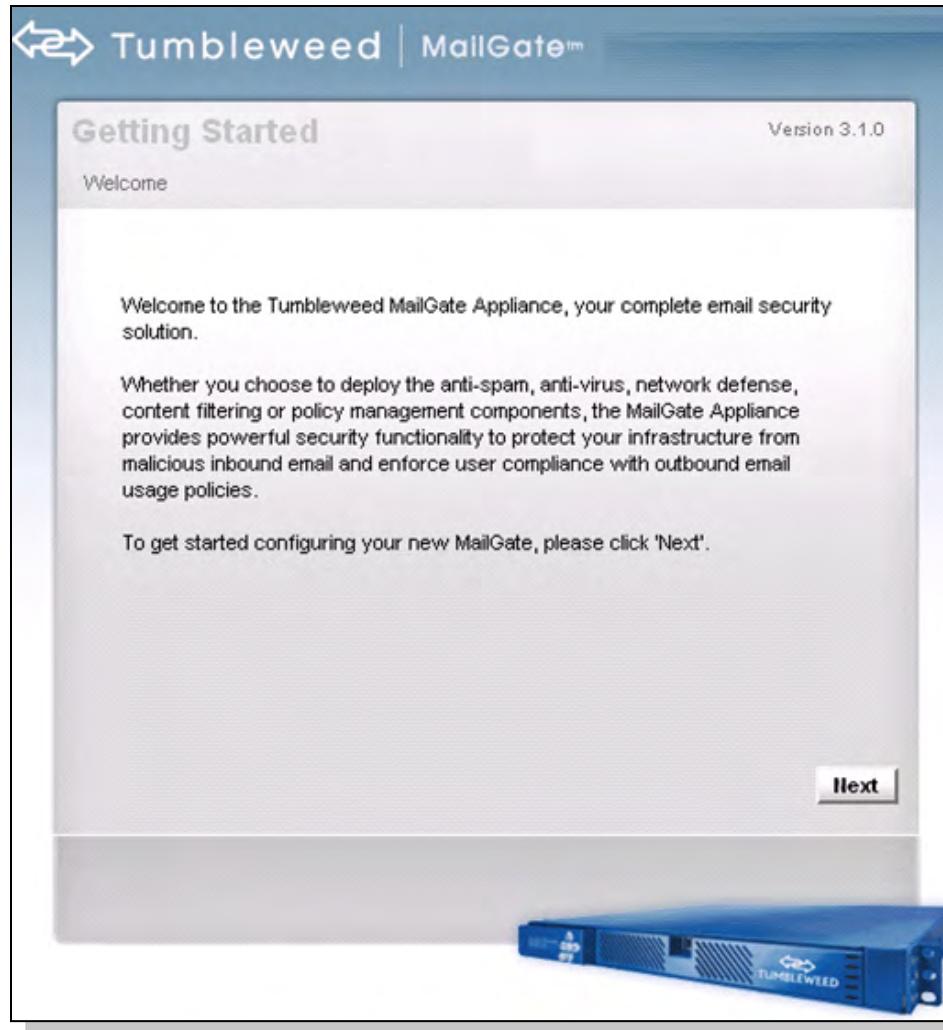
- Question/answer and query dialogue
- Form-fills and spreadsheets



Query Interfaces

- **Question/answer interfaces**
 - user led through interaction via series of questions
 - suitable for novice users but restricted functionality
 - often used in information systems
- **Query languages (e.g. SQL)**
 - used to retrieve information from database
 - requires understanding of database structure and language syntax, hence requires some expertise

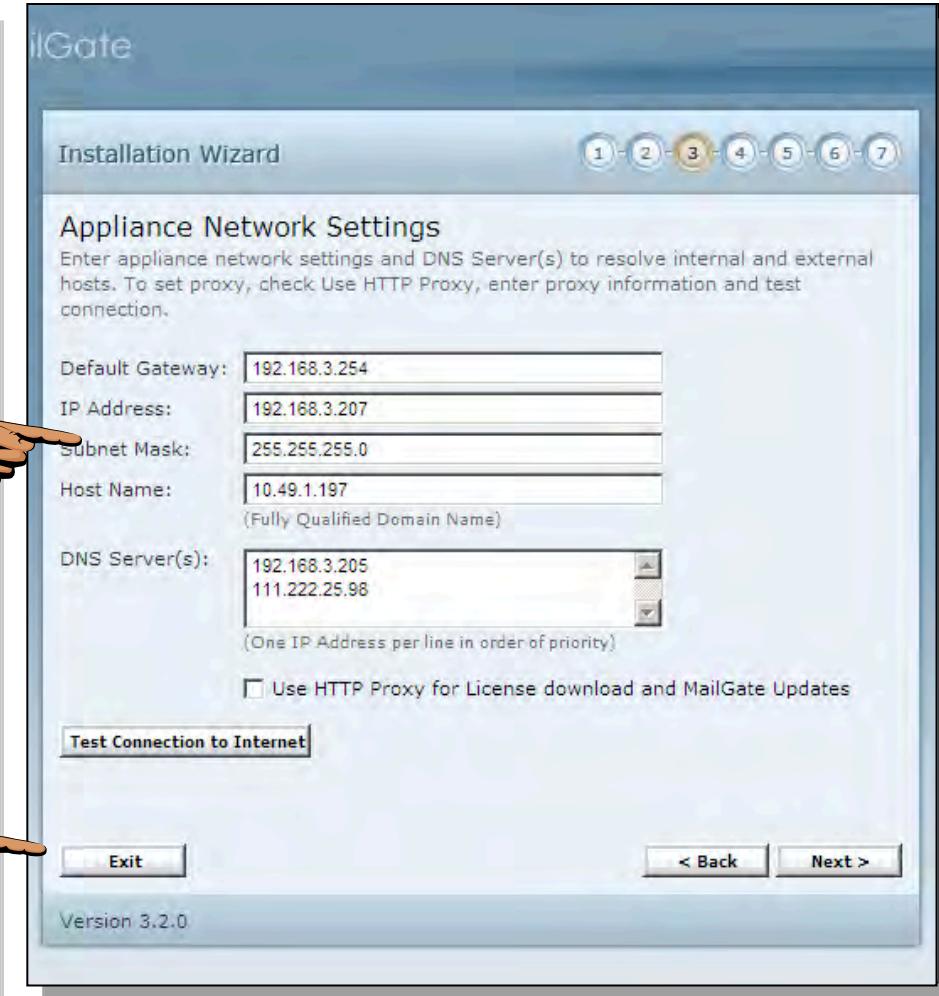
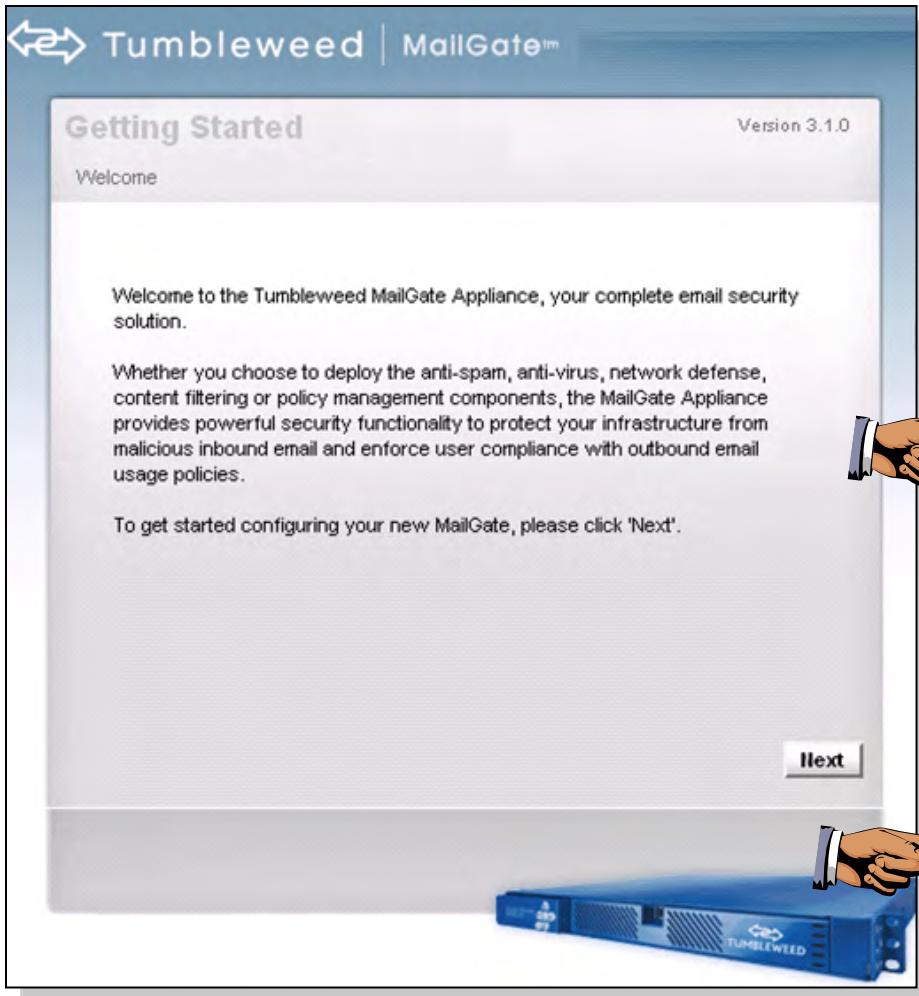
Installation Wizard (Then)



Installation Wizard (Now)



Installation Wizard (Compare)



Form-fills

- Primarily for data entry or data retrieval
- Screen like paper form.
- Data put in relevant place
- Requires
 - good design
 - obvious correction facilities

The screenshot shows a window titled "Go-faster Travel Agency Booking". Inside, a message says "Please enter details of journey:". There are four input fields: "Start from: Lancaster", "Destination: Atlanta", and "Via: Leeds" (which is highlighted with a blue border). Below these are three radio buttons for travel type: "First class / Second class / Bargain" (with "First class" selected), "Single / Return" (with "Return" selected), and "Seat number: [empty field]". On the left side of the window, there is a vertical toolbar with icons for "Favorites", "History", and "Search". A red rectangular box surrounds the entire form area.



Spreadsheets

- first spreadsheet VISICALC, followed by Lotus 1-2-3
MS Excel most common today
- sophisticated variation of form-filling.
 - grid of cells contain a value or a formula
 - formula can involve values of other cells
 - e.g. sum of all cells in this column
 - user can enter and alter data spreadsheet maintains consistency

Form-fills

Direct Deposit

To request direct deposit to your bank account, complete the following information. After selecting this form to Wells Fargo. If you cannot print this form, please call 1-800-956-4442 for assistance.

Your name	<input type="text"/>
Your address	<input type="text"/>
City	<input type="text"/>
State	-- <input type="button" value="▼"/>
Zip	<input type="text"/> - <input type="text"/>
Social Security Number	<input type="text"/>
Home phone #	(<input type="text"/>) <input type="text"/> - <input type="text"/>
Work phone #	(<input type="text"/>) <input type="text"/> - <input type="text"/>
Payment type	Select One <input type="button" value="▼"/>
Other payment type	<input type="text"/>
Deposit account	<input type="text"/>
Routing transit #*	<input type="text"/>
Company name	<input type="text"/>
Company address	<input type="text"/> <input type="text"/>
City	<input type="text"/>
State	-- <input type="button" value="▼"/>
Zip	<input type="text"/> - <input type="text"/>
Company contact name (if known)	<input type="text"/>
Company contact phone # (if known)	(<input type="text"/>) <input type="text"/> - <input type="text"/>

*Enter number at bottom of check between 1- marks



Summary

- **Query interfaces lead users through interaction via series of questions.**
- **It is suitable for novice users but restricted functionality.**
- **Form-fills are used primarily for data entry or data retrieval in screen like paper form by putting Data in relevant place.**



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Common Interaction Styles

- Command
- Speech
- Data-entry
- Form fill-in
- Query
- Graphical
- Web
- Pen
- Augmented reality
- Gesture

Tips & Tools



Command Line Interface

- Way of expressing instructions to the computer directly
 - function keys, single characters, short abbreviations, whole words, or a combination
- suitable for repetitive tasks
- better for expert users than novices
- offers direct access to system functionality
- command names/abbreviations should be meaningful!

Typical example: the Unix system

```
r [args]          reply to (and delete) current letter via mail [args]
s [files]         save (and delete) current message (default mbox)
u [#]            undelete message # (default current message)
w [files]         save (and delete) current message without header
x                exit without changing mail
y [files]         save (and delete) current message (default mbox)
? quit
/home/amoallem> ls -l
total 48088
-rw----- 1 amoallem fac      3431 Jan 10  2000 amoallem
-rw----- 1 amoallem fac      878 Jan 18 14:04 dead.letter
drwxrwxrwx 2 amoallem fac      96 Dec 20  1999 forwards
-rw----- 1 amoallem fac     21 Dec 16  2002 forwards
-rw----- 1 amoallem fac      2999 Sep 26  1999 fr.list
drwxr-- 2 amoallem sta     2048 Mar 14 11:50 mail
-rw----- 1 amoallem fac    24577883 Mar 14 11:57 mbox
drwxr-- 2 amoallem fac      96 Dec 20  1999 moallem
-rw----- 1 amoallem fac      392 Apr 25  2001 n
-rw----- 1 amoallem fac     10818 Sep 29  1998 old.mail
-rw----- 1 amoallem fac     1605 Aug  7   1997 ram.mail
-rw----- 1 amoallem fac     2142 Sep 26  1999 u.fr.list
/home/amoallem> _
```



Command-based

- Commands such as abbreviations (e.g. ls) typed in at the prompt to which the system responds (e.g. listing current files)
- Some are hard wired at keyboard, others can be assigned to keys
- Efficient, precise, and fast
- Large overhead to learning set of commands



Second Life command-based interface for visually impaired users



Figure 6.1 Second Life command-based interface for visually impaired users

Source: Reproduced with permission from <http://www.eelke.com/images/textsl.jpg>.



Common Interaction Styles

- Question/answer and query dialogue
- Form-fills and spreadsheets



Design Issues

- Form, name types and structure are key research questions
- Consistency is most important design principle
 - e.g. always use first letter of command
- Command interfaces popular for web scripting

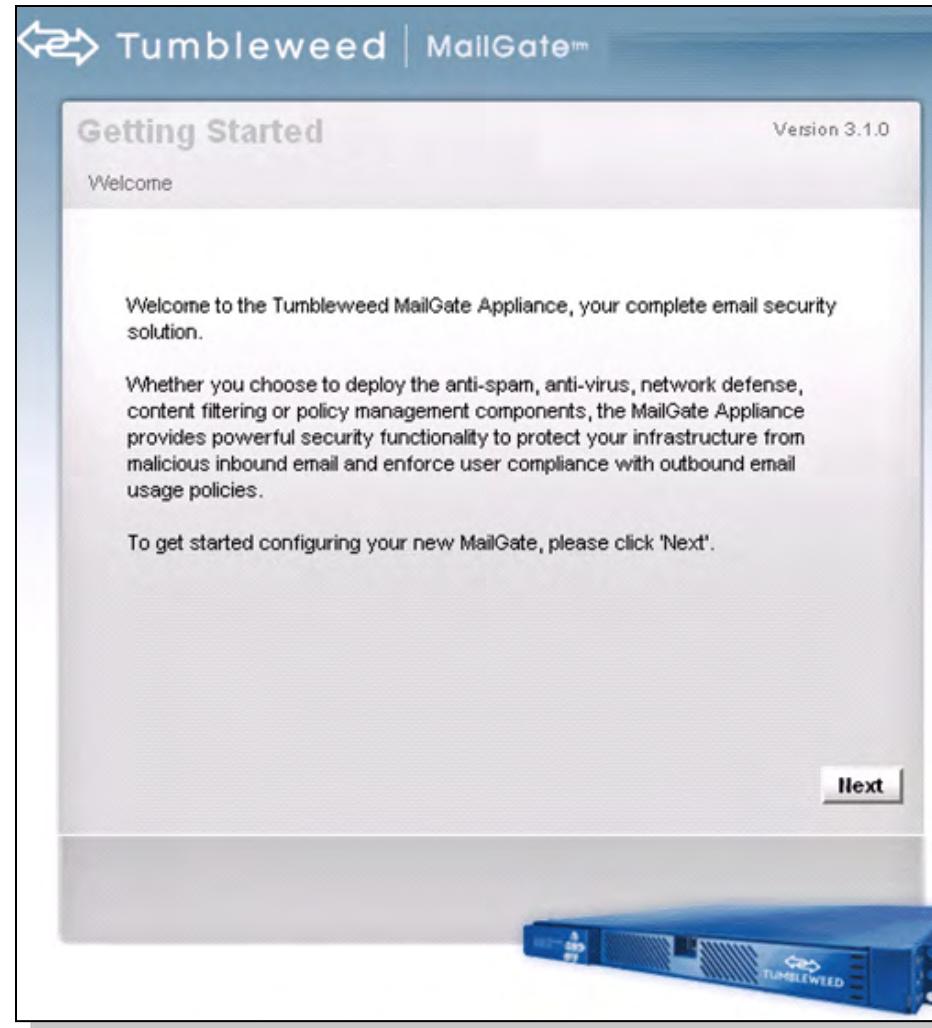


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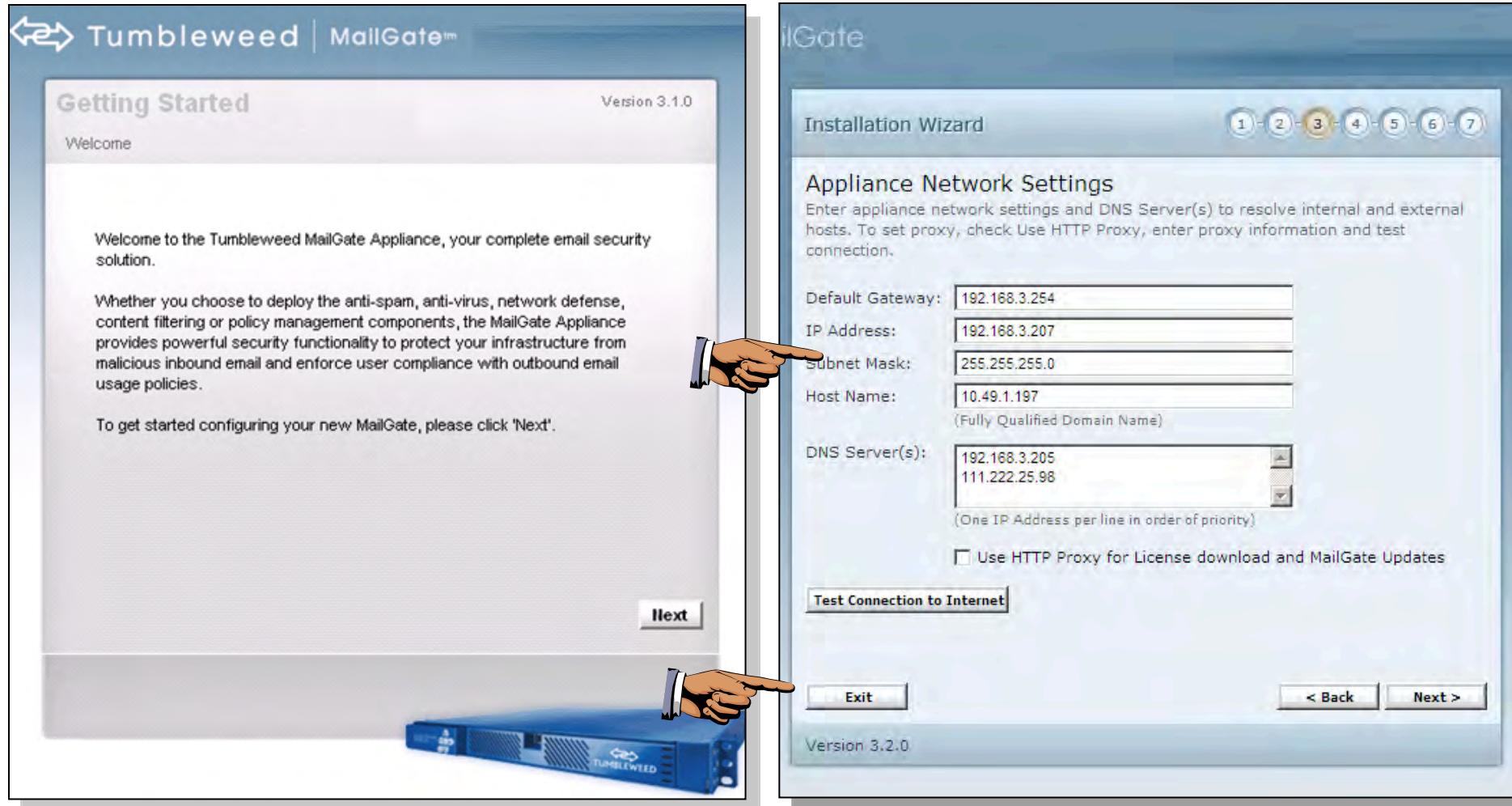




Installation Wizard (Now)



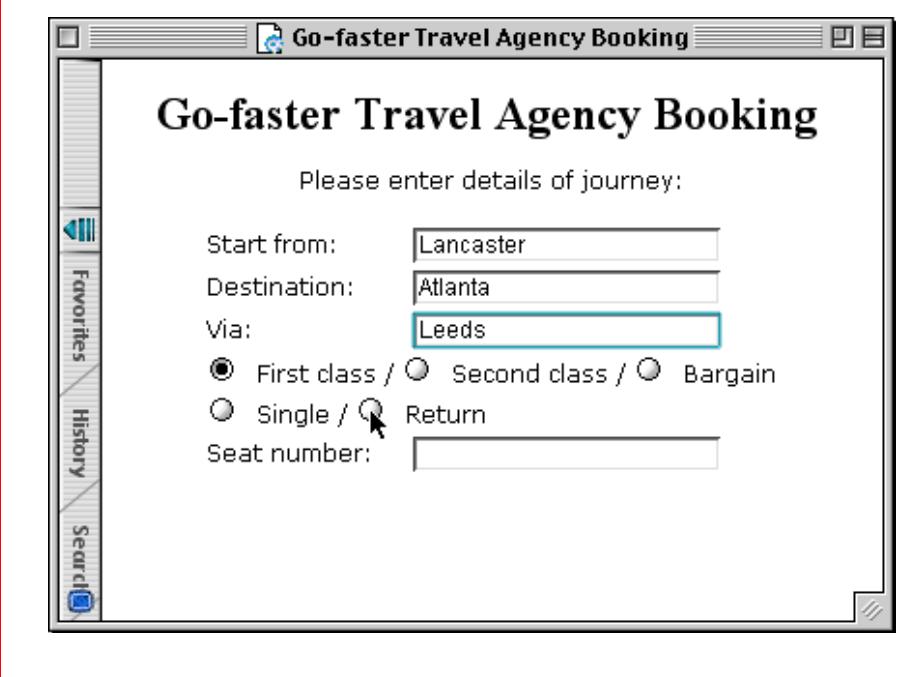
Installation Wizard (Compare)





Form-fills

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- Screen like paper form.
- Data put in relevant place
- Requires
 - good design
 - obvious correction facilities



The screenshot shows a window titled "Go-faster Travel Agency Booking". The window has a vertical toolbar on the left with buttons for "Favorites", "History", and "Search". The main area contains the following fields:

- Start from: Lancaster
- Destination: Atlanta
- Via: Leeds (highlighted with a red border)
- Travel options:
 - First class / Second class / Bargain
 - Single / Return
- Seat number: [empty input field]



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Home phone #	(<input type="text"/>) <input type="text"/> - <input type="text"/>
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Deposit account	<input type="text"/> <input type="button" value="▼"/>
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State	-- <input type="button" value="▼"/>
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- **It is suitable for novice users but restricted functionality.**
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Xerox Star first WIMP -> rise to GUIs

- **Windows**
 - could be scrolled, stretched, overlapped, opened, closed, and moved around the screen using the mouse
- **Icons**
 - represented applications, objects, commands, and tools that were opened when clicked on
- **Menus**
 - offering lists of options that could be scrolled through and selected
- **Pointing device**
 - a mouse controlling the cursor as a point of entry to the windows, menus, and icons on the screen



WIMP Interface

Windows

Icons

Menus

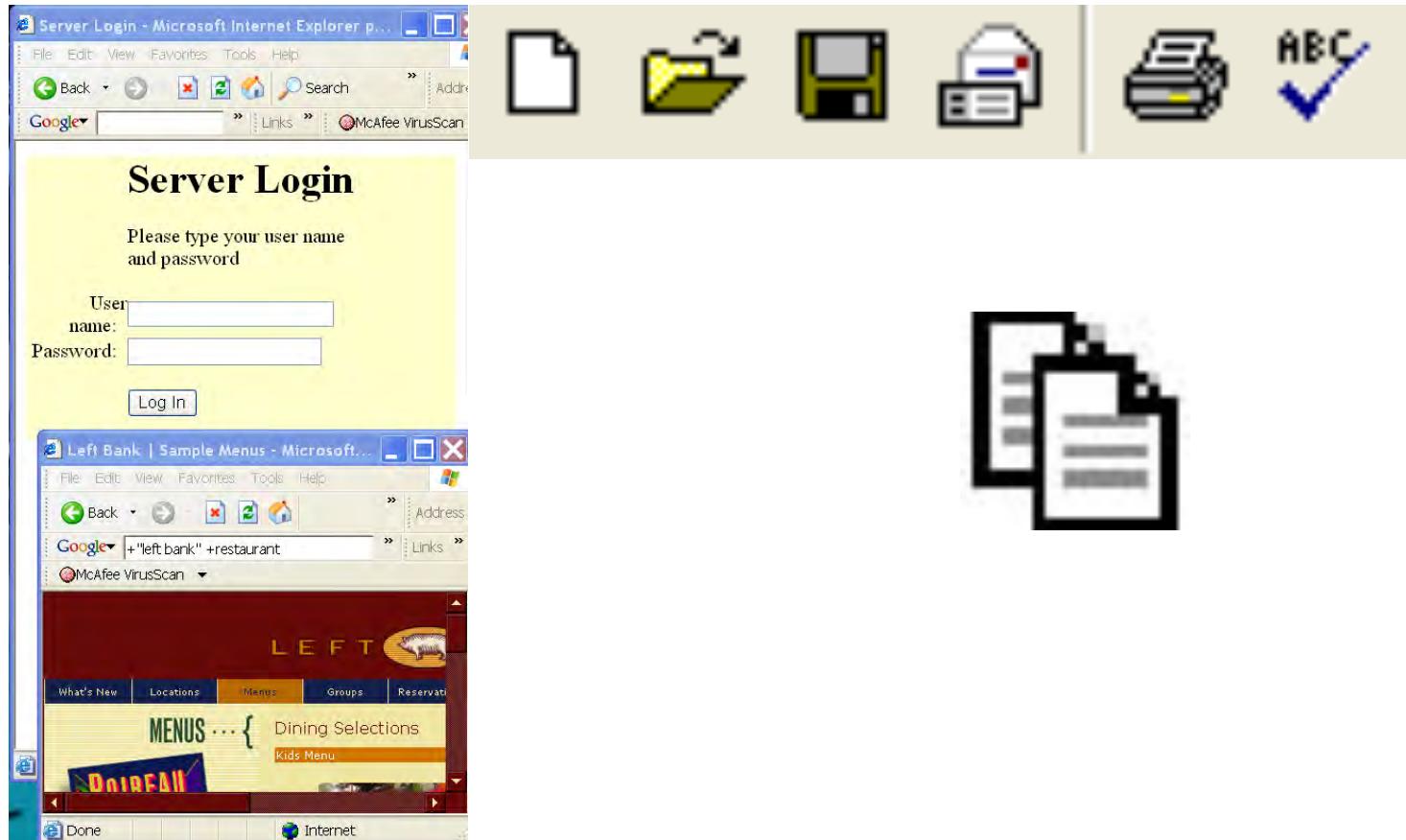
Pointers

... or windows, icons, mice, and pull-down menus!

- **default style for majority of interactive computer systems, especially PCs and desktop machines**



Windows, Icons. Menus & Pointers (WIMP)



- Same basic building blocks as WIMPs but more varied
 - Color, 3D, sound, animation,
 - Many types of menus, icons, windows
- New graphical elements, e.g.
 - toolbars, docks, rollovers
- Challenge now is to design GUIs that are best suited for tablet, smartphone and smartwatch interfaces



Windows

- **Areas of the screen that behave as if they were independent**
 - can contain text or graphics
 - can be moved or resized
 - can overlap and obscure each other, or can be laid out next to one another (tiled)
- **Scrollbars**
 - allow the user to move the contents of the window up and down or from side to side
- **Title bars**
 - describe the name of the window



Windows

- **Windows were invented to overcome physical constraints of a computer display**
 - enable more information to be viewed and tasks to be performed
- **Scroll bars within windows also enable more information to be viewed**
- **Multiple windows can make it difficult to find desired one**
 - listing, iconising, shrinking are techniques that help



Is this method any better?

F	G	H	I	J
Fiji	Gabon	Haiti	Iceland	Jamaica
Finland	Germany	Holland	India	Japan
France	Gibraltar	Honduras	Indonesia	Jordan
French Guyana	Greece	Hong Kong	Iran	
French Polynesia	Greenland	Hungary	Ireland	
	Guadeloupe		Israel	
	Guam		Italy	
	Guatemala		Ivory Coast	

Figure 6.5 An excerpt of the listing of countries in alphabetical order from interflora.co.uk

Source: www.interflora.co.uk. Reproduced with permission.



Design Issues

Window management

- enables users to move fluidly between different windows (and monitors)
- How to switch attention between windows without getting distracted
- Design principles of spacing, grouping, and simplicity should be used



Elements of the WIMP Interface

Windows,

Icons,

Menus

Pointers

Buttons

Toolbars

Dialog boxes

also see supplementary material
on choosing wimp elements

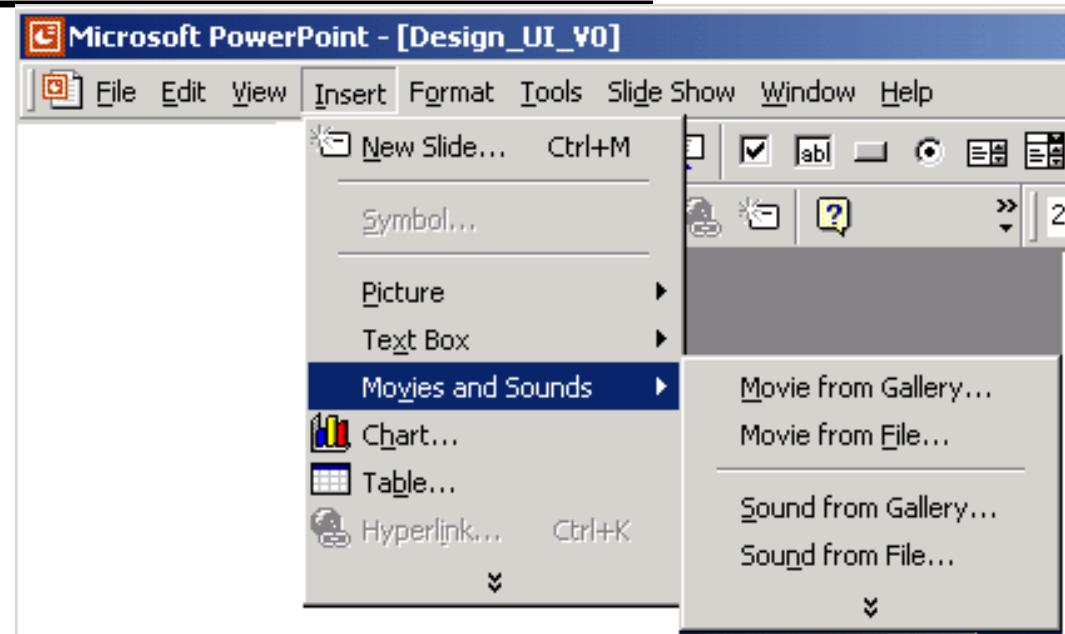


Menus

- **Set of options displayed on the screen**
- **Options visible**
 - less recall - easier to use
 - rely on recognition so names should be meaningful
- **Selection by:**
 - numbers, letters, arrow keys, mouse
 - combination (e.g. mouse plus accelerators)
- **Often options hierarchically grouped**
 - sensible grouping is needed
- **Restricted form of full WIMP system**



Menus





Menus

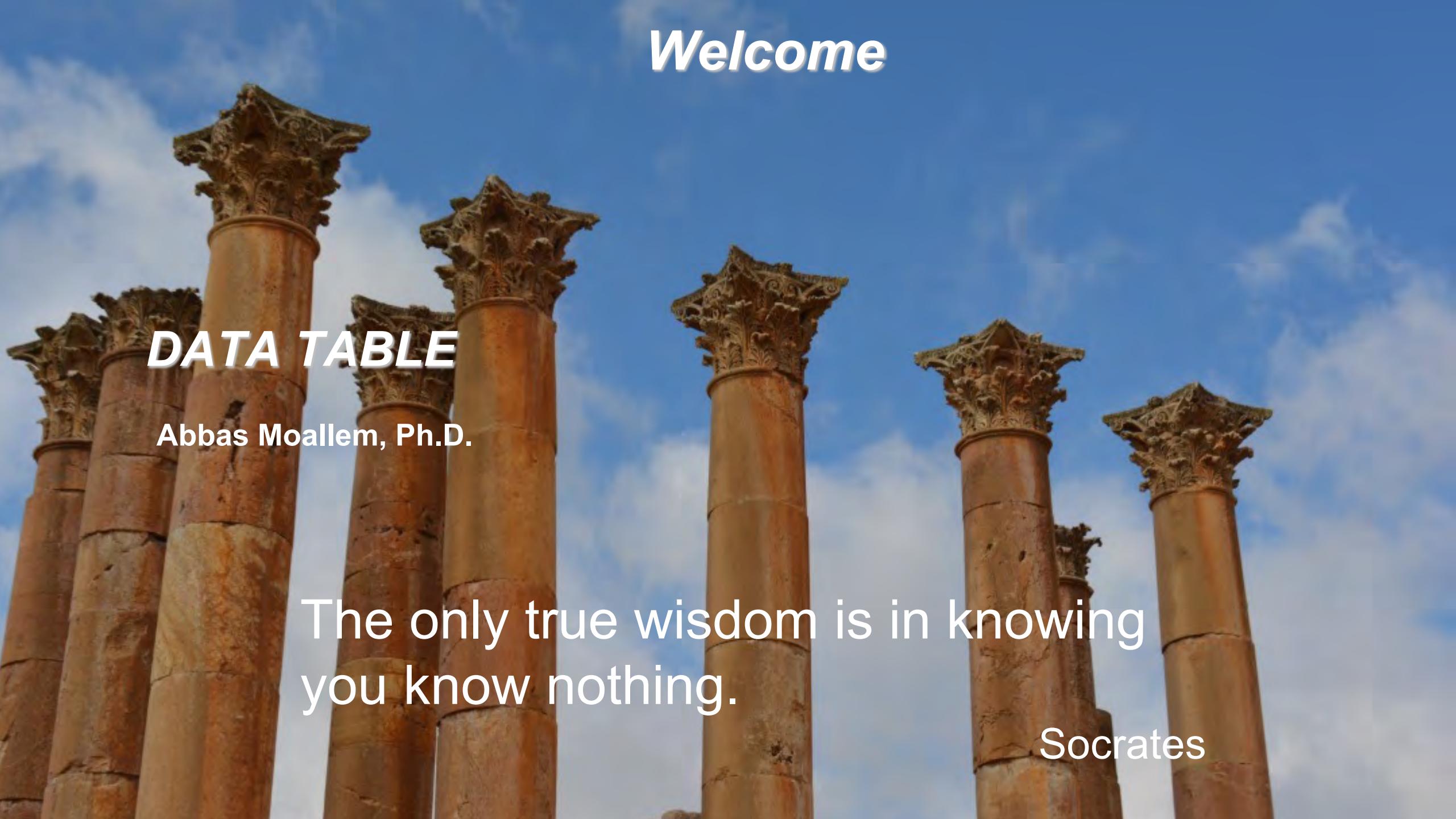
- A number of menu interface styles
 - flat lists, drop-down, pop-up, contextual, and expanding ones, e.g., scrolling and cascading
- Flat menus
 - good at displaying a small number of options at the same time and where the size of the display is small, e.g. iPods
 - but have to nest the lists of options within each other, requiring several steps to get to the list with the desired option
 - moving through previous screens can be tedious



Menus Extras

- **Cascading menus**
 - hierarchical menu structure
 - menu selection opens new menu
 - and so in ad infinitum
 - **Keyboard accelerators**
 - key combinations - same effect as menu item
 - two kinds
 - active when menu open – usually first letter
 - active when menu closed – usually Ctrl + letter
- usually different !!!**





Welcome

DATA TABLE

Abbas Moallem, Ph.D.

The only true wisdom is in knowing
you know nothing.

Socrates

Change all these labels in the HTML template

View list by: Select

Nav Link 1 | Nav Link 2 | Nav Link 3 | Nav Link 4 | Nav Link 5 | Nav Link 6

ID	Name	Amount	Type	Last Activity
10464	Value goes here	\$1,325,000.00	Type 1	Lead Identified
10413	Value goes here	\$2,800,000.00	Type 2	Lead Identified
2224	Value will truncate automatically	\$2,830,000.00	Type 3	Lead Identified
10014	Change this	\$1,032,500.00	Type 4	Lead Identified
10015	to anything	\$3,315,000.00	Type 4	Lead Identified
10081	that you want	\$2,800,000.00	Type 1	Lead Identified
10299	Ien't this html	\$460,000.00	Type 1	Lead Identified
10464	template great?	\$1,325,000.00	Type 2	Lead Identified
10413	Visit dashboardspy.com	\$2,800,000.00	Conv.	Lead Identified
2224	for more dashboards	\$2,830,000.00	Type 3	Lead Identified
10014	Hubert Lee	\$1,032,500.00	Type 3	Lead Identified
10015	is The Dashboard Spy	\$3,315,000.00	Type 4	Lead Identified
10081	Connect to him	\$2,800,000.00	Type 4	Lead Identified
10299	on LinkedIn	\$460,000.00	Type 4	Lead Identified

Tables

Table Design



What's Moving		Gainers/Losers		Most Active
Gainers & Losers		Price	Change	% Change
ATVI	Activision Blizzar...	47.23	+7.50	+18.88%
CBG	CBRE Group Inc	34.00	+2.43	+7.70%
NWSA	News Corp	13.29	+0.90	+7.26%
NWS	News Corp	13.60	+0.85	+6.67%
ARNC	Arconic Inc	29.62	+1.66	+5.94%
CERN	Cerner Corp	51.50	-2.38	-4.42%
EVHC	Envision Healthcar...	68.44	-2.43	-3.43%
TDC	Teradata Corp	31.68	-1.06	-3.24%
WU	Western Union Co	19.74	-0.64	-3.14%
NVDA	NVIDIA Corp	113.62	-2.76	-2.37%

Data as of 4:03pm ET



Data Table

- Familiarity
- Easy to create and simplicity in development,
- Easy to find and modify data in a table.
- Users usually are already working with Excel
- Easy to find and modify data in a table.

Is Table Vitalization?

Grid

American Stocks

Name	Jan	Feb	Mar
INDU:IND	17,834.17	18,004.03	21,134.17
SPX:IND	1,932.60	2,012.60	2,132.60
CCMP:IND	4,958.95	5,058.95	5,158.95
NYA:IND	9,609.85	10,209.85	10,609.85
SPTSX:IND	13,468.55	14,168.55	14,468.55

Chart

American Stocks





Data Table Attribute

- **Size**
- **Typography**
- **Information Hierarchy and Focusing Attention**
- **Redundancy and Duplication**
- **Bulk Actions**
- **Interactivity**
 - Bulk Actions
 - Grouping and Sorting
 - Pagination
 - Inline Edit
 - Detail Preview

Size

Row height

Name	ID	Status	Valuation (USD)	Name	ID	Status	Valuation (USD)
1. Green	MG233	Active	\$ 3'234'500	1. Mark Green	MG233	Active	\$ 3'234'500
2. Tom Jackson	TJ3346	Active	\$ 3'100'345	2. Tom Jackson	TJ3346	Active	\$ 3'100'345
3. Tim Berg	TB3232	Active	\$ 115'600	3. Tim Berg	TB3232	Active	\$ 115'600
4. Jeff Roden	JF4355	Archived	\$ 1'124'300	4. Jeff Roden	JF4355	Archived	\$ 1'124'300
5. Kate Watson	KW345	Retired	\$ 123'445	5. Kate Watson	KW345	Archived	\$ 123'445
				6. Jessi Johnson	JJ3432	Archived	\$ 224'040
				7. Mark Green	MG342	Blocked	\$ 234'500
				8. Tom Jackson	TJ2343	Retired	\$ 1010'345

Row Height

Row height

Name	ID	Status	Valuation (USD)	Name	ID	Status	Valuation (USD)
1. Green	MG233	Active	\$ 3'234'500	1. Mark Green	MG233	Active	\$ 3'234'500
2. Tom Jackson	TJ3346	Active	\$ 3'100'345	2. Tom Jackson	TJ3346	Active	\$ 3'100'345
3. Tim Berg	TB3232	Active	\$ 115'600	3. Tim Berg	TB3232	Active	\$ 115'600
4. Jeff Roden	JF4355	Archive	\$ 1'124'300	4. Jeff Roden	JF4355	Archive	\$ 1'124'300
5. Kate Watson	KW345	Archive	\$ 123'445	5. Kate Watson	KW345	Archive	\$ 123'445
				6. Jessi Johnson	JJ3432	Archive	\$ 224'040
				7. Mark Green	MG342	Blocked	\$ 234'500
				8. Tom Jackson	TJ2343	Archive	\$ 1010'345



Typography

- **Don't Use All Caps as it is hard to read**
- **Avoid using Serif fonts as they create additional visual noise**
- **Avoid using bold and italic**
- **Use good fonts only**



Text Alignment

- **Right-aligned numeric columns**
- **Left-aligned text columns**
- **Column names aligned according to column content**

Text Alignment

Don't.

Order Description	Amount	Qty
Forson Inc, Limited	\$ 234'500	1000
Marta Skyson,4.5%,23/08/2016	\$ 100'345	234
Shell trinity group, hold 1200	\$ 5'600	320
Forson Inc, limit @ 450	\$ 2300	60
Marta Skyson,4.5%,23/08/2016	\$ 123'445	2300
Shell trinity group, hold 1200,	\$ 24'040	1000
Marta Skyson,4.5%,23/08/2016	\$ 234'500	234

Do.

Order Description	Amount	Qty
Forson Inc, Limited	\$ 234'500	1000
Marta Skyson,4.5%,23/08/2016	\$ 100'345	234
Shell trinity group, hold 1200	\$ 5'600	320
Forson Inc, limit @ 450	\$ 2'300	60
Marta Skyson,4.5%,23/08/2016	\$ 123'445	2300
Shell trinity group, hold 1200,	\$ 24'040	1000
Marta Skyson,4.5%,23/08/2016	\$ 234'500	234

Don't Use All Caps as it is hard to read

Don't.

Name	ID	Status	Valuation (USD)
1. MARK GREEN	MG233	ACTIVE	\$ 3'234'500
2. TOM JACKSON	TJ3346	ACTIVE	\$ 3'100'345
3. TIM BERG	TB3232	ACTIVE	\$ 115'600
4. JEFF RODEN	JF4355	ARCHIVE	\$ 1'124'300
5. KATE WATSON	KW345	ARCHIVE	\$ 123'445
6. JESSI JOHNSON	JJ3432	ARCHIVE	\$ 224'040
7. MARK GREEN	MG342	BLOCKED	\$ 234'500
8. TOM JACKSON	TJ2343	ARCHIVE	\$ 1010'345

Do.

Name	ID	Status	Valuation (USD)
1. Mark Green	MG233	Active	\$ 3'234'500
2. Tom Jackson	TJ3346	Active	\$ 3'100'345
3. Tim Berg	TB3232	Active	\$ 115'600
4. Jeff Roden	JF4355	Archive	\$ 1'124'300
5. Kate Watson	KW345	Archive	\$ 123'445
6. Jessi Johnson	JJ3432	Archive	\$ 224'040
7. Mark Green	MG342	Blocked	\$ 234'500
8. Tom Jackson	TJ2343	Archive	\$ 1010'345

Information Hierarchy & Focusing Attention

Focus Point

Transaction	Status	Order#	Qty	Ammount (USD)	Order Description
↗ Buy	Pending	52231234	1000	\$ 234'500	Forson Inc, limit @ 450
Sell	Pending	23135356	234	\$ 100'345	Marta Skyson,4.5%,23/08/2016
Sell	Pending	21324356	320	\$ 5'600	Shell trinity group, hold 1200, 8/08/2017
↗ Buy	Filled	123213213	60	\$ 2300	Forson Inc, limit @ 450
Sell	Filled	39983230	2300	\$ 123'445	Marta Skyson,4.5%,23/08/2016
↗ Buy	Filled	23340001	1000	\$ 24'040	Shell trinity group, hold 1200, 8/08/2017
Sell	Canceled	33030345	234	\$ 234'500	Forson Inc, limit @ 450
					BINGO!!!
↗ Buy	Filled	52231234	1000	\$ 100'345	Marta Skyson,4.5%,23/08/2016
Sell	Filled	23135356	234	\$ 5'600	Shell trinity group, hold 1200, 8/08/2017
Sell	Canceled	21324356	320	\$ 2300	Forson Inc, limit @ 450

Redundancy and Duplication

Don't.

Name	ID	Status
Mark Green	Client MG233	Document Sent
Tom Jackson	Client TJ3346	Document Sent
Tim Berg	Client TB3232	Document Sent
Jeff Roden	Client JF4355	Document Error
Jessi Johnson	Client KW345	Document Sent
Mark Green	Client JJ3432	Document Error
Tom Jackson	Client MG342	Document Sent
Tim Berg	Client TJ2343	Document Sent
Jeff Roden	Client TB323	Document Sent

Do.

Name	Client ID	Documnet Status
Mark Green	MG233	✓ Sent
Tom Jackson	TJ3346	✓ Sent
Tim Berg	TB3232	✓ Sent
Jeff Roden	JF4355	✗ Error
Jessi Johnson	KW345	✓ Sent
Mark Green	JJ3432	✗ Error
Tom Jackson	MG342	✓ Sent
Tim Berg	TJ2343	✓ Sent
Jeff Roden	TB323	✓ Sent

Redundancy and Duplication

Don't.

Name	ID	Status	Valuation (USD)
1. Mark Green	MG233	Active	\$ 3'234'500
2. Tom Jackson	TJ3346	Active	\$ 3'100'345
3. Tim Berg	TB3232	Active	\$ 115'600
4. Jeff Roden	JF4355	Archive	\$ 1'124'300
5. Kate Watson	KW345	Archive	\$ 123'445
6. Jessi Johnson	JJ3432	Archive	\$ 224'040
7. Mark Green	MG342	Blocked	\$ 234'500
8. Tom Jackson	TJ2343	Archive	\$ 1010'345

Do.

Name	ID	Status	Valuation (USD)
1. Mark Green	MG233	Active	\$ 3'234'500
2. Tom Jackson	TJ3346	Active	\$ 3'100'345
3. Tim Berg	TB3232	Active	\$ 115'600
4. Jeff Roden	JF4355	Archive	\$ 1'124'300
5. Kate Watson	KW345	Archive	\$ 123'445
6. Jessi Johnson	JJ3432	Archive	\$ 224'040
7. Mark Green	MG342	Blocked	\$ 234'500
8. Tom Jackson	TJ2343	Archive	\$ 1010'345

Bulk Actions

Bulk Actions

	Transaction	Status	Order#	Qty	Amount (USD)	Order Description
<input type="checkbox"/>	↗ Buy	Pending	52231234	1000	\$ 234'500	Forson Inc, limit @ 450
<input checked="" type="checkbox"/>	Sell	Pending	23i35356	234	\$ 100'345	Marta Skyson,4.5%,23/08/2016
<input checked="" type="checkbox"/>	Sell	Pending	21324356	320	\$ 5'600	Shell trinity group, hold 1200, 8/08/2017
<input checked="" type="checkbox"/>	↗ Buy	Filled	123213213	60	\$ 2300	Forson Inc, limit @ 450
<input type="checkbox"/>	Sell	Filled	39983230	2300	\$ 123'445	Marta Skyson,4.5%,23/08/2016
<input type="checkbox"/>	↗ Buy	Filled	23340001	1000	\$ 24'040	Shell trinity group, hold 1200, 8/08/2017
<input checked="" type="checkbox"/>	Sell	Canceled	33030345	234	\$ 234'500	Forson Inc, limit @ 450
<input type="checkbox"/>	↗ Buy	Filled	52231234	1000	\$ 100'345	Marta Skyson,4.5%,23/08/2016
<input type="checkbox"/>	Sell	Filled	23i35356	234	\$ 5'600	Shell trinity group, hold 1200, 8/08/2017



Interactivity

- Bulk Actions
- Grouping and Sorting
- Pagination
- Inline Edit
- Detail Preview

Grouping and Sorting

Group by & Sorting

Orders				Group By:	Status
	Transaction	Order#	Qty	Amount (USD)	
▼ Status: Pending (6)					
	Buy	52231234	1000	\$ 234'500	
	Sell	23135356	234	\$ 100'345	
	↗ Sell	21324356	320	\$ 5'600	
	Buy	123213213	60	\$ 2300	
	↗ Sell	39983230	2300	\$ 123'445	
	Buy	23340001	1000	\$ 24'040	
► Status: Filled (23)					
► Status: Canceled (7)					

Orders				
Name	ID	Status	Valuation (USD)	↑
Mark Green	MG233	Active	\$ 3'234'500	
Tom Jackson	TJ3346	Active	\$ 3'100'345	
Tim Berg	TB3232	Active	\$ 2'115'600	
Jeff Roden	JF4355	Archive	\$ 1'124'300	
Kate Watson	KW345	Archive	\$ 923'445	
Jessi Johnson	JJ3432	Archive	\$ 824'040	
Mark Green	MG342	Archive	\$ 534'500	
Tom Jackson	TJ2343	Archive	\$ 10'345	
Tim Berg	TB323	Canceled	\$ 4'300	
Jeff Roden	TB323		\$ 900	

Pagination

Pagination

Transaction	Status	Order#	Qty	Amount (USD)	Order Description
↗ Buy	Pending	52231234	1000	\$ 234'500	Forson Inc, limit @ 450
Sell	Pending	23i35356	234	\$ 100'345	Marta Skyson,4.5%,23/08/2016
Sell	Pending	21324356	320	\$ 5'600	Shell trinity group, hold 1200, 8/08/2017
↗ Buy	Filled	123213213	60	\$ 2300	Forson Inc, limit @ 450
Sell	Filled	39983230	2300	\$ 123'445	Marta Skyson,4.5%,23/08/2016
↗ Buy	Filled	23340001	1000	\$ 24'040	Shell trinity group, hold 1200, 8/08/2017
Sell	Canceled	33030345	234	\$ 234'500	Forson Inc, limit @ 450
↗ Buy	Filled	52231234	1000	\$ 100'345	Marta Skyson,4.5%,23/08/2016

1

2

3

4

5

F

H

20

Items per page

1 - 20 of 91 items



Colum Resizing

Fixed Columns

Transaction	Status	Order#	Qty	Amount (USD)	Order Description
↗ Buy	Pending	52231234	1000	\$ 234'500	Forson Inc, limit @ 450
Sell	Pending	23135356	234	\$ 100'345	Marta Skyson,4.5%,23/08/2016
Sell	Pending	21324356	320	\$ 5'600	Shell trinity group, hold 1200, 8/08/2017
↗ Buy	Filled	123213213	60	\$ 2300	Forson Inc, limit @ 450
Sell	Filled	39983230	2300	\$ 123'445	Marta Skyson,4.5%,23/08/2016
↗ Buy	Filled	23340001	1000	\$ 24'040	Shell trinity group, hold 1200, 8/08/2017
Sell	Canceled	33030345	234	\$ 234'500	Forson Inc, limit @ 450
↗ Buy	Filled	52231234	1000	\$ 100'345	Marta Skyson,4.5%,23/08/2016

Inline Edit

Inline, Batch Edit

 Save  Cancel

Transaction	Order#	Qty	Amount (USD)	Order Description
Buy	52231234	1000	\$ 234'500	Forson Inc, limit @ 450
Sell	23i35356	234	\$ 100'345	Marta Skyson,4.5%,23/08/2016
Sell	21324356	320	\$ 5'600	Shell trinity group, hold 1200, 8/08/2017
Buy	123213213	245	\$ 2300	Forson Inc, limit @ 450
Hold	39983230	2300	\$ 123'445	Marta Skyson,4.5%,23/08/2016
Bid	23340001	1000	\$ 24'040	Shell trinity group, hold 1200, 8/08/2017
Sell	33030345	234	\$ 234'500	Forson Inc, limit @ 450
Buy	52231234	1000	\$ 100'345	Marta Skyson,4.5%,23/08/2016

Detail View

Details Preview

Transaction	Status	Order#	Qty	Forson Inc	X
↗ Buy	Pending	52231234	1000	>	
Sell	Pending	23i35356	234	>	
Sell	Pending	21324356	320	>	
↗ Buy	Filled	123213213	60	<	
Sell	Filled	39983230	2300	>	
↗ Buy	Filled	23340001	1000	>	
Sell	Canceled	33030345	234	>	
↗ Buy	Filled	52231234	1000	>	
Sell	Filled	23i35356	234	>	
Sell	Canceled	21324356	320	>	

↗ Buy Forson Inc, Limited

\$ 234'500

60 / \$ 1234.23

Forson Inc, Limited Marta Skyson,4.5%,23/08/2016
Shell trinity group, hold 1200



RF control							Thermal control							
Bias 13.56MHz		Pulsing			Cathode & ESC temperature			AR	C4F6	C4F6_IGI	CF4			
W _{B1}	RFM	f _P	D _{Cs}	D _{CB1}	D _{B1}	T _c	T _I	T _{MI}	CF4_H	CH2F2	CH3F	CH4	E	CL
100	C	10000	50	50	0	60	80.5	80	CF4_H	CH2F2	CH3F	CH4	20	300
100	C	10000	50	50	0	60	80	80	CHF3	CL2	CL2_H	COS	20	300
100	C	10000	50	50	0	60	80	80	HBr	He	IOSON3 35	N2	20	300
100	C	10000	50	50	0	60	80	80	NF3	O2	O2_H	O2_HI	20	200
17	100	C	10000	50	50	0	60	80	O2_IGI	SF6	SiCL4	SiCL4	20	200
17	100	C	10000	50	50	0	60	80	SNE361				20	200
.17	100	C	10000	50	50	0	60	80						

Location	Temperature	Wind Direction	Wind Speed	Carbon Monoxide (CO)	Hydrogen Sulphide (H2S)	Nitrogen Dioxide (NO2)	Ozone (O3)	Particulate Matter (PM2.5)	Sulphur Dioxide (SO2)
San Francisco, CA	24.50 degC	279 degree	6 mph	1.7 ppm	0.00014 ppm	0.0278 ppm	0.058 ppm	14 ug/m3	0.0032 ppm
San Francisco, CA	25.00 degC	279 degree	5 mph	1.2 ppm	0.00013 ppm	0.0270 ppm	0.046 ppm	11 ug/m3	0.0056 ppm
San Francisco, CA	24.4 degC	282 degree	9 mph	1.2 ppm	0.00012 ppm	0.0248 ppm	0.074 ppm	12 ug/m3	0.0045 ppm
San Francisco, CA	24.1 degC	279 degree	5 mph	1.5 ppm	0.00010 ppm	0.0174 ppm	0.069 ppm	9 ug/m3	0.0056 ppm
Sunnyvale, CA	26.00 degC	281 degree	9 mph	1.0 ppm	0.00011 ppm	0.0234 ppm	0.071 ppm	13 ug/m3	0.0033 ppm
Sunnyvale, CA	26.50 degC	281 degree	5 mph	1.2 ppm	0.00016 ppm	0.0223 ppm	0.080 ppm	11 ug/m3	0.0038 ppm
Los Gatos, CA	16.16 degC	279 degree	8 mph	1.8 ppm	0.00014 ppm	0.0265 ppm	0.050 ppm	14 ug/m3	0.0045 ppm
Napa, CA	14.95 degC	278 degree	8 mph	1.3 ppm	0.00016 ppm	0.0209 ppm	0.072 ppm	14 ug/m3	0.0045 ppm
Fairfield, CA	16.32 degC	280 degree	7 mph	1.4 ppm	0.00017 ppm	0.0271 ppm	0.067 ppm	7 ug/m3	0.0051 ppm
San Mateo, CA	13.10 degC	278 degree	6 mph	1.1 ppm	0.00018 ppm	0.0250 ppm	0.084 ppm	8 ug/m3	0.0038 ppm
Berkeley, CA	18.36 degC	279 degree	6 mph	1.3 ppm	0.00012 ppm	0.0237 ppm	0.076 ppm	10 ug/m3	0.0042 ppm
Castro Valley, CA	14.02 degC	278 degree	9 mph	1.6 ppm	0.00013 ppm	0.0299 ppm	0.064 ppm	11 ug/m3	0.0055 ppm
Oakland, CA	11.84 degC	279 degree	10 mph	1.3 ppm	0.00014 ppm	0.0227 ppm	0.075 ppm	12 ug/m3	0.0051 ppm
Alameda, CA	16.66 degC	280 degree	10 mph	1.7 ppm	0.00009 ppm	0.0238 ppm	0.064 ppm	8 ug/m3	0.0049 ppm
Fremont, CA	15.30 degC	278 degree	5 mph	1.3 ppm	0.00014 ppm	0.0297 ppm	0.054 ppm	11 ug/m3	0.0064 ppm
Petaluma, CA	11.90 degC	279 degree	6 mph	1.5 ppm	0.00012 ppm	0.0198 ppm	0.056 ppm	10 ug/m3	0.0061 ppm
Milpitas, CA	16.37 degC	279 degree	8 mph	1.7 ppm	0.00016 ppm	0.0177 ppm	0.073 ppm	17 ug/m3	0.0048 ppm
Pleasanton, CA	11.62 degC	281 degree	8 mph	1.6 ppm	0.00014 ppm	0.0297 ppm	0.068 ppm	11 ug/m3	0.0058 ppm
Walnut Creek, CA	17.68 degC	278 degree	10 mph	1.2 ppm	0.00013 ppm	0.0333 ppm	0.058 ppm	8 ug/m3	0.0057 ppm
Martinez, CA	12.77 degC	280 degree	10 mph	1.5 ppm	0.00013 ppm	0.0199 ppm	0.083 ppm	13 ug/m3	0.0031 ppm
Daly City, CA	14.78 degC	278 degree	9 mph	1.7 ppm	0.00018 ppm	0.0272 ppm	0.054 ppm	13 ug/m3	0.0027 ppm
South San Francisco, CA	15.13 degC	281 degree	8 mph	1.2 ppm	0.00009 ppm	0.0268 ppm	0.049 ppm	14 ug/m3	0.0052 ppm

A wide-angle photograph of the ancient Roman city of Jerash, Jordan. The scene is dominated by the Great Cardo Maximus, a massive street paved with large, rectangular stone tiles. Both sides of the street are flanked by rows of tall, cylindrical columns made of light-colored stone. Some columns stand upright, while others are partially collapsed or broken. In the background, more of the city's ruins are visible, including a large, ornate temple structure on a hillside. The sky is a clear, pale blue with a few wispy clouds.

Thank You For Your Participation