User Interface Design

User Interface Design

- Think of examples
- Good examples, personal favorites, smart UIs
- Poor examples, the ones you really hate to use
- and reasons for your verdict

This Lecture

- Cover some basics of UI design
  - This is the field of Human Computer Interaction
- Won't cover implementation technologies
  - Java Swing, jQuery+CSS, YUI, Adobe Flex, etc
- Won't cover special interfaces such as cell phones, fax machines, cars, etc

Principle

- UI design is more like film-making than bridge-building
  - About communication
  - Requires understanding audience
  - Requires specialized skills
  - Requires iteration

Principle cont.:

- Design for people
  - people's tasks, goals, and values drive development
  - work with users throughout the process
    - (rare, regular, extreme users)
  - assess decisions from the vantage point of users, their work, and their environment
  - pay attention to people's abilities and situation
  - talk to actual(!) experts

Observing Users: Need finding techniques

- "You can observe a lot just by watching" Yogi Berra

- 5 key things to learn with participant observation

1 What do people do now?

2 What values and goals do people have?

3 How are these particular activities embedded in a larger ecology?

4 Similarities and differences across people

5 … and other types of context, like time of day

User Interface Design

- After data modeling?
  - for information systems. – Yes
  - for video games. – No

- By a specialist?
  - for mass-market software. – Yes
  - for in-house systems. – No

Design alternatives

- Novice users

- Expert users

Design alternatives

- Novice users
  - Menus
  - Make it look like something else (analogy)
  - Simple
- Expert users
  - Commands
  - Specialize to make users efficient
  - Powerful

Human Factors

1. People have limited short-term memory (about 7 items of information)

2. Users make mistakes, especially under stress or under information overload

3. Users have differing capabilities and interaction preferences

UI Design Principles

- User Familiarity
  - UI should use terms/concepts drawn from the experience of users
- Consistency
  - Comparable operations activated in the same way
- Minimal Surprise
- Recoverability from errors
- User Guidance
  - UI should provide context-based help and meaningful feedback when errors occur

Examples

- Familiarity:
  - What objects should an air traffic control software provide to users?
- Consistency:
  - How many of you use emacs/vi as well as a different text editor?
- User Diversity:
  - Some users may be color-blind

Golden Rules

- Place the user in control
- Reduce the user’s memory load
- Be consistent

Place the User in Control

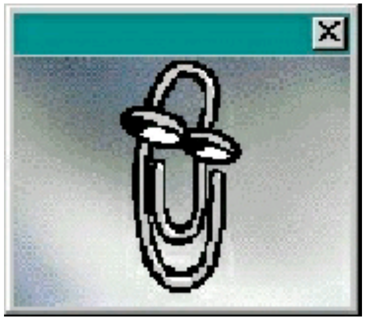
- No modes (i.e., different modes of operation: e.g., editing vs viewing)
  - Use a new window instead of a new mode
  - Make modes visible
- Undo
  - Users make errors, probably several in sequence
- Macros
  - For power users
- Hide technical details

User Interaction

- Direct manipulation
  - User interacts directly with objects on screen (e.g., with mouse or finger)
  - Fast and intuitive but requires visual metaphor
- Menu selection
  - Avoids user errors but slow for experienced users
- Form fill-in
  - Simple data entry but could be long
- Command language (Unix)
  - Powerful and flexible, high learning curve

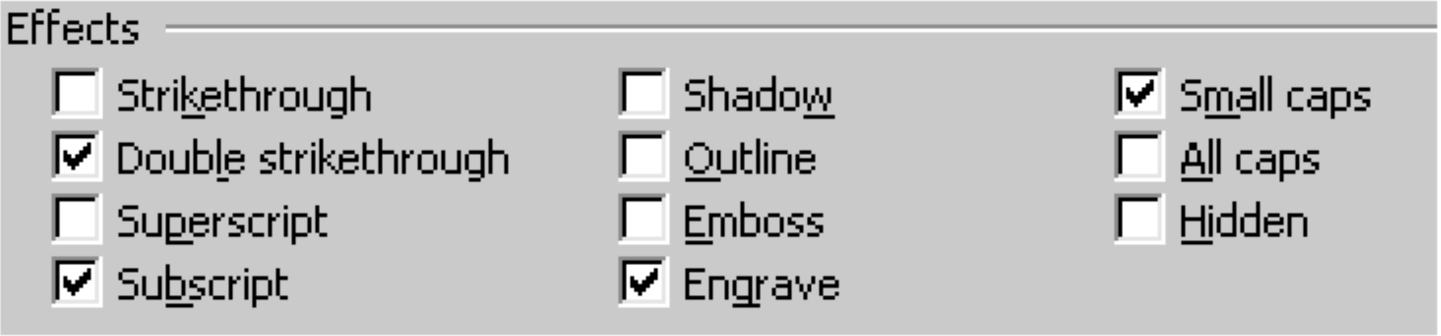
Obtrusive Assistance

Microsoft Office Assistant “Clippy the Paperclip”



Further reading:
Luke Swartz, Why people hate the paperclip: labels, appearance behavior and social responses to user interface agents,
MS thesis, Symbolic systems program, Stanford U, 2003

Nonobvious choices



Effects

- □ Strikethrough
- ☑ Double strikethrough
- □ Superscript
- ☑ Subscript
- □ Shadow
- □ Outline
- □ Emboss
- ☑ Engrave
- ☑ Small caps
- □ All caps
- □ Hidden

Reduce Memory Load

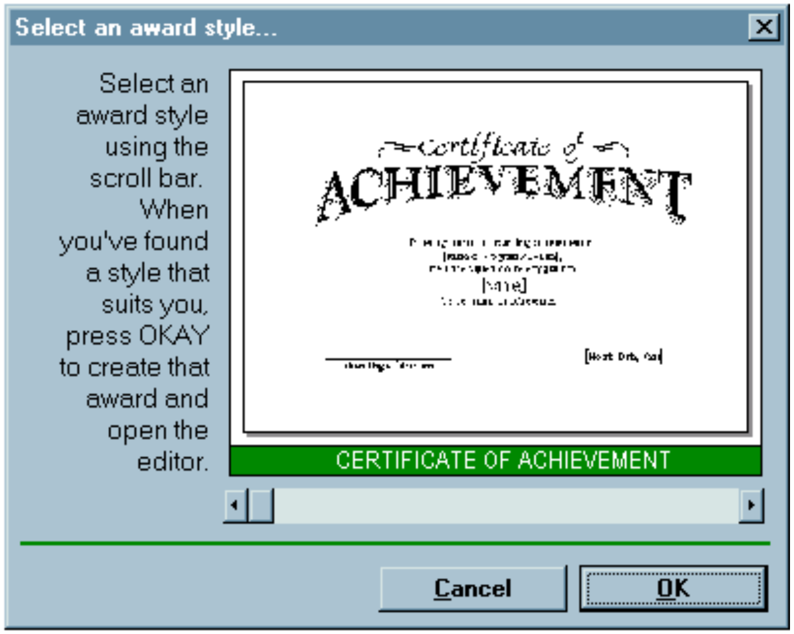
- Reduce demand on short-term memory
- Establish meaningful defaults
- Define intuitive shortcuts
- Disclose information progressively
- Use real-world metaphors
- Speak user's language
- Let user recognize, not remember

Common techniques

- Menus with keyboard shortcuts
- Dialog boxes
- Tabs
- Toolbar

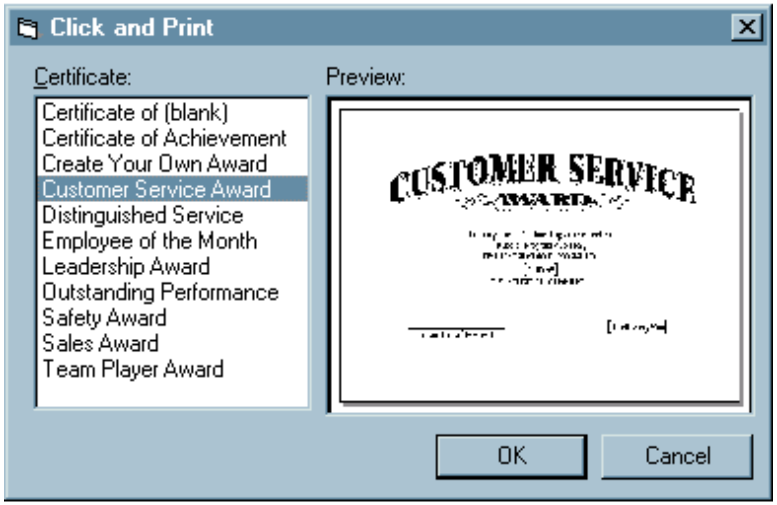
Be Consistent

- Use visual interface standards
  - for operating system
  - for organization
  - for product or set of products
- Show context - keep user from getting lost
  - E.g., with "trail"
- System should explain itself



Select an award style using the scroll bar. When you've found a style that suits you, press OKAY to create that award and open the editor.

CERTIFICATE OF ACHIEVEMENT



Certificate:

- Certificate of (blank)
- Certificate of Achievement
- Create Your Own Award
- Customer Service Award
- Distinguished Service
- Employee of the Month
- Leadership Award
- Outstanding Performance
- Safety Award
- Sales Award
- Team Player Award

UI Patterns

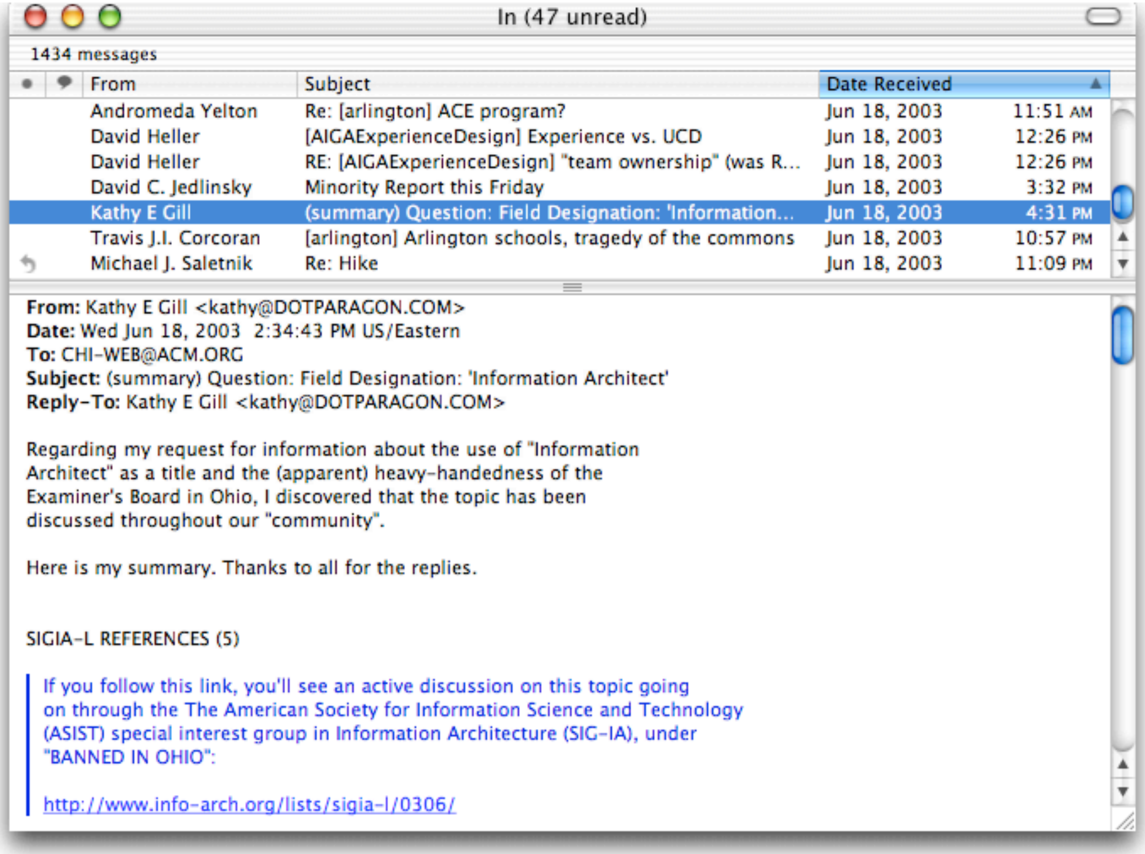
Patterns are

- Things that repeat
- Solutions to common problems
- Tried and true solutions
- Expert knowledge

UI Patterns and Techniques

- Jenifer Tidwell: Designing Interfaces
- http://www.designinginterfaces.com/
- accessible online at SWEM:
- https://catalog.swem.wm.edu/Record/3309452

Two panel selector



From	Subject	Date Received	
Andromeda Yelton	Re: [arlington] ACE program?	Jun 18, 2003	11:51 AM
David Heller	[AIGAExperienceDesign] Experience vs. UCD	Jun 18, 2003	12:26 PM
David Heller	RE: [AIGAExperienceDesign] "team ownership" (was R...	Jun 18, 2003	12:26 PM
David C. Jedlinsky	Minority Report this Friday	Jun 18, 2003	3:32 PM
Kathy E Gill	(summary) Question: Field Designation: 'Information...	Jun 18, 2003	4:31 PM
Travis J.I. Corcoran	[arlington] Arlington schools, tragedy of the commons	Jun 18, 2003	10:57 PM
Michael J. Saletnik	Re: Hike	Jun 18, 2003	11:09 PM

From: Kathy E Gill <kathy@DOTPARAGON.COM>
Date: Wed Jun 18, 2003 2:34:43 PM US/Eastern
To: CHI-WEB@ACM.ORG
Subject: (summary) Question: Field Designation: 'Information Architect'
Reply-To: Kathy E Gill <kathy@DOTPARAGON.COM>

Regarding my request for information about the use of "Information Architect" as a title and the (apparent) heavy-handedness of the Examiner's Board in Ohio, I discovered that the topic has been discussed throughout our "community".

Here is my summary. Thanks to all for the replies.

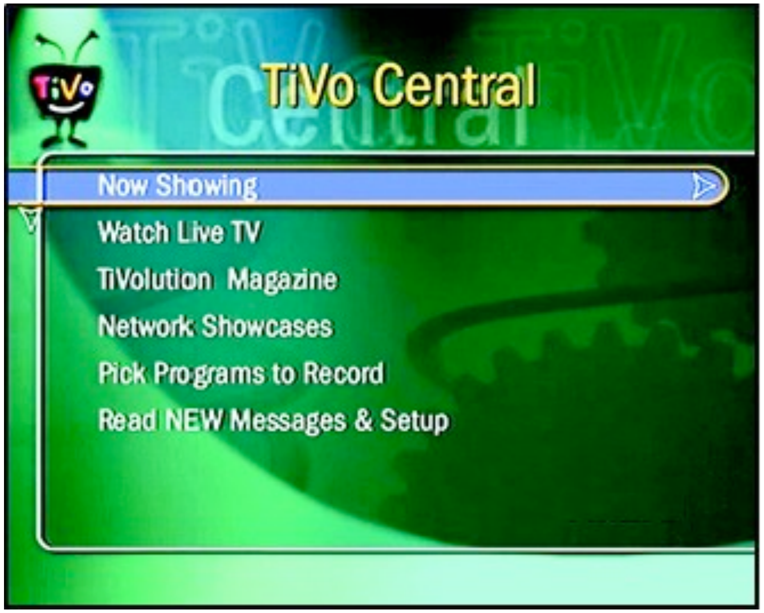
SIGIA-L REFERENCES (5)

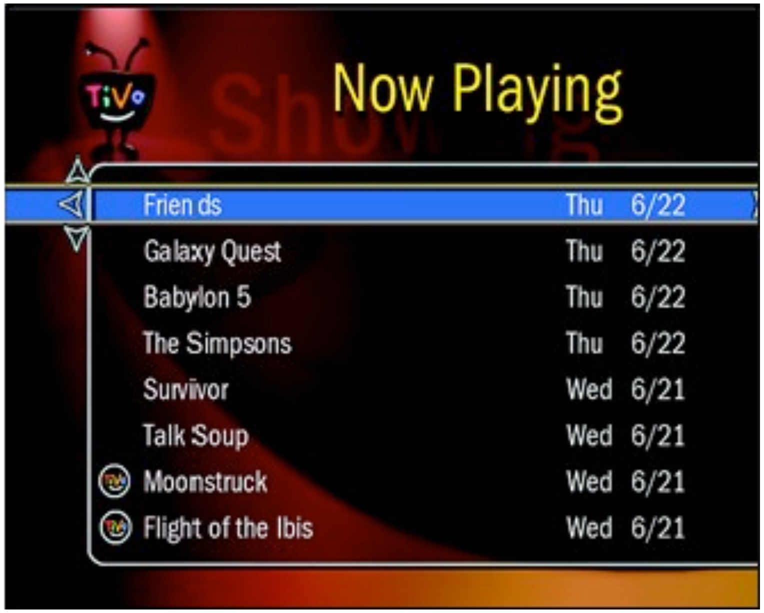
> If you follow this link, you'll see an active discussion on this topic going on through the The American Society for Information Science and Technology (ASIST) special interest group in Information Architecture (SIG-IA), under "BANNED IN OHIO":
>
> http://www.info-arch.org/lists/sigia-l/0306/

Two panel selector

- When to use?
  - You want the user to see the overall structure of the list, but you also want the user to walk through the items at her/his own pace, in an order of her/his choosing
  - Physically, the display is large enough to show two separate panels at once
- Why?
  - It reduces physical effort
  - It reduces visual cognitive load
  - It reduces the user's memory burden

One-window drill-down



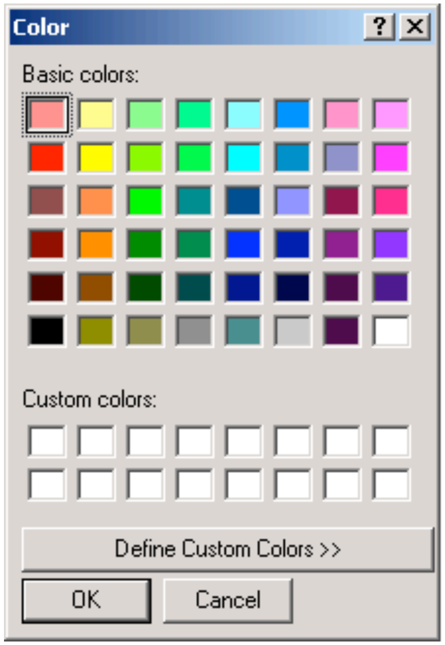


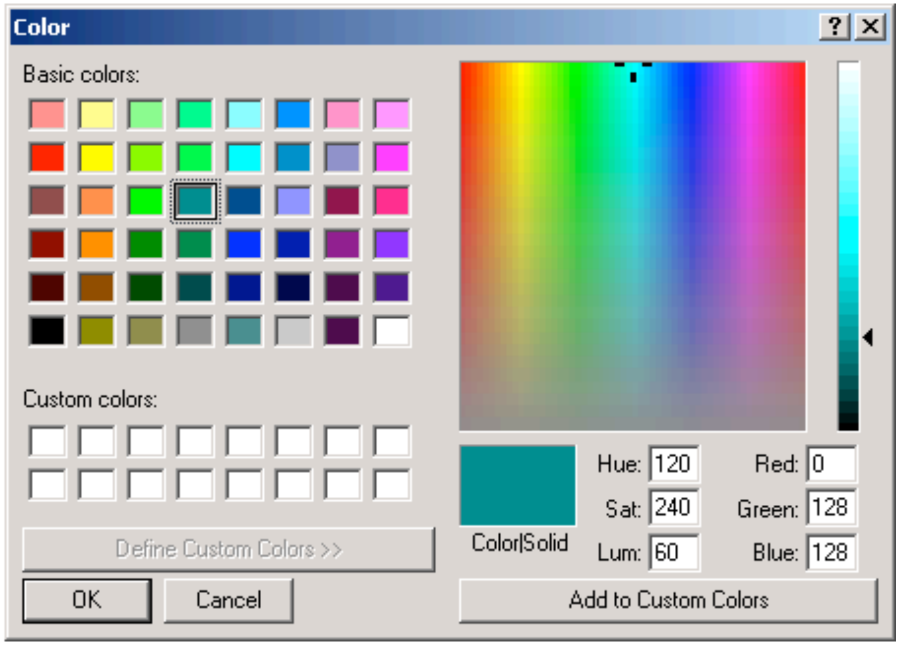
Frien ds	Thu	6/22
Galaxy Quest	Thu	6/22
Babylon 5	Thu	6/22
The Simpsons	Thu	6/22
Surviivor	Wed	6/21
Talk Soup	Wed	6/21
Moonstruck	Wed	6/21
Flight of the Ibis	Wed	6/21

One-window drill-down

- When to use?
  - Many pages of content hyperlinked or hierarchically organized
  - You are building for a device with tight space restrictions
  - Even if you build for a desktop or laptop screen, you may have a complexity limit
- Why?
  - Web-browser metaphor
  - Keep it simple

Extras on demand



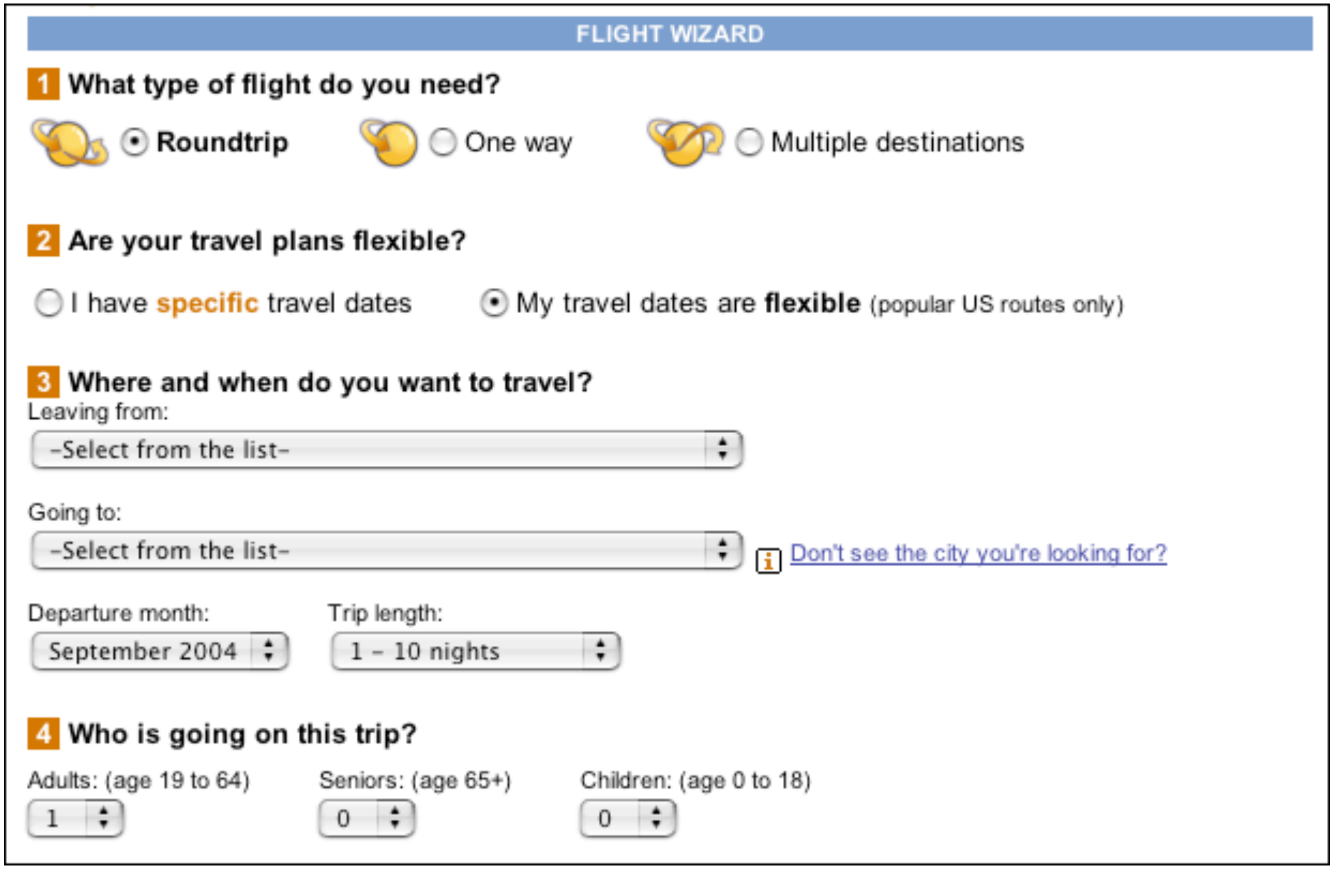


Hue: 120
Sat: 240
Lum: 60
Red: 0
Green: 128
Blue: 128

Extras on demand

- When to use?
  - There's too much stuff to be shown on the page, but some of it isn't very important.
- Why?
  - Simple UI is often better than a complex one, especially for new users, or users who don't need all the functionality you can provide.

Step by step instructions



FLIGHT WIZARD

1 What type of flight do you need?

● **Roundtrip** ○ One way ○ Multiple destinations

2 Are your travel plans flexible?

○ I have **specific** travel dates ● My travel dates are **flexible** (popular US routes only)

3 Where and when do you want to travel?

Leaving from:

-Select from the list-

Going to:

-Select from the list- Don't see the city you're looking for?

Departure month: September 2004

Trip length: 1 - 10 nights

4 Who is going on this trip?

Adults: (age 19 to 64) 1

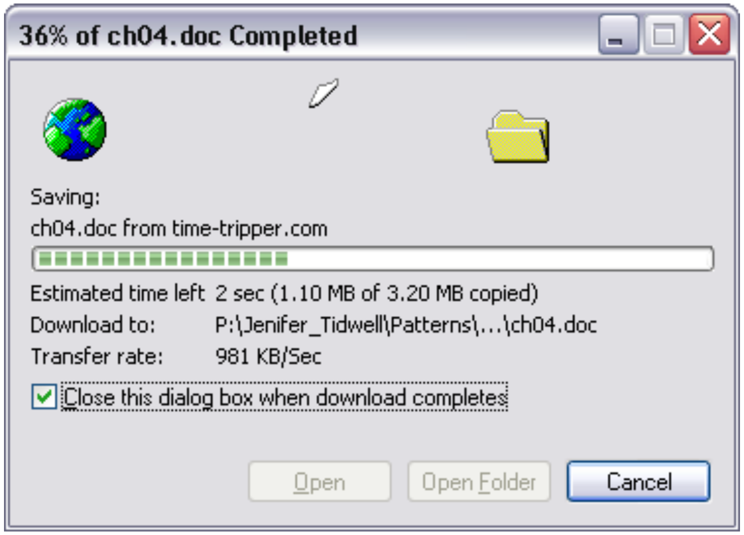
Seniors: (age 65+) 0

Children: (age 0 to 18) 0

Step by step instructions

- When to use?
  - You are designing a UI for a task that is long or complicated, and that will be novel for the user
  - Those of you who design the UI knows more than the user does about how best to get the task done.
  - The user must be willing to surrender control over what happens when.
    - Making decisions is an unwelcome burden for people doing certain things: "Don't make me think, just tell me what to do next."
- Why?
  - By splitting up the task into a sequence of chunks, you effectively simplify the task
  - Could be frustrating to experts: know your users well

Progress Indicator



36% of ch04.doc Completed

Saving:

ch04.doc from time-tripper.com

Estimated time left 2 sec (1.10 MB of 3.20 MB copied)

Download to: P:\Jenifer_Tidwell\Patterns\...\ch04.doc

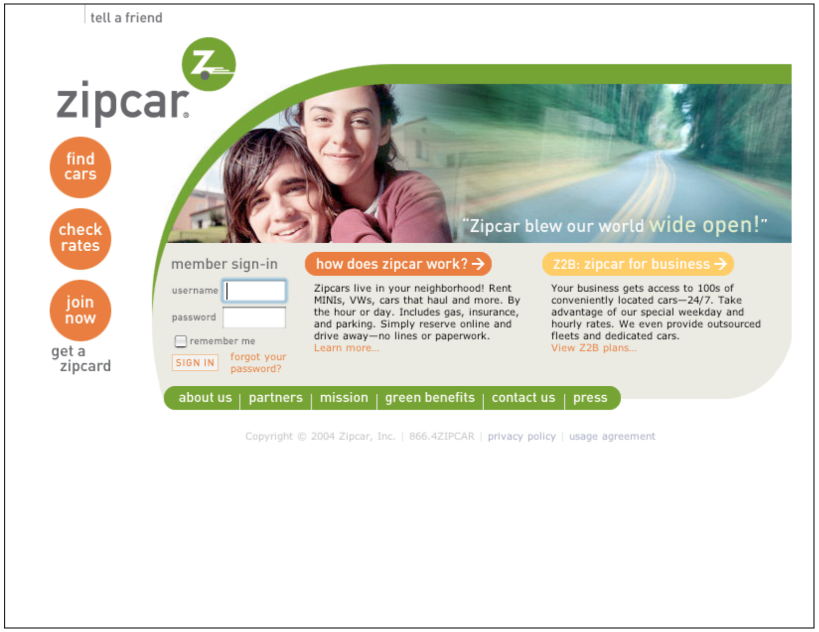
Transfer rate: 981 KB/Sec

☑ Close this dialog box when download completes

Progress Indicator

- When to use?
  - A time-consuming operation interrupts the UI, or runs in the background, for longer than two seconds or so.
- **Why:**
  - Users get impatient when the UI just sits there.
  - Experiments show that if users see an indication that something is going on, they're much more patient, even if they have to wait longer than they would without a progress indicator

Visual Framework



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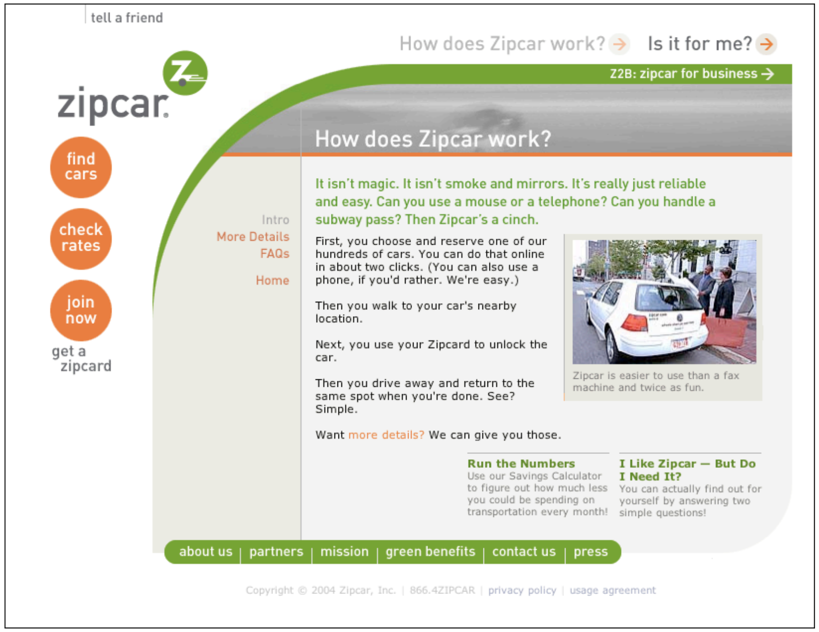

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It isn't magic. It isn't smoke and mirrors. It's really just reliable and easy. Can you use a mouse or a telephone? Can you handle a subway pass? Then Zipcar's a cinch.

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Then you walk to your car's nearby location.

Next, you use your Zipcard to unlock the car.

Then you drive away and return to the same spot when you're done. See? Simple.

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You can actually find out for yourself by answering two simple questions!

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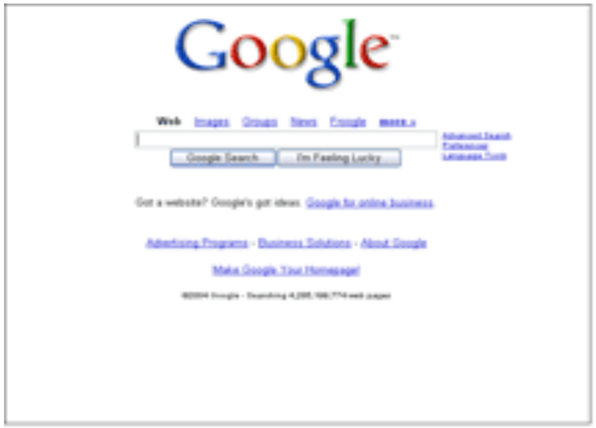
Visual Framework

- Design each page to use the same basic layout, colors, and stylistic elements, but give the design enough flexibility to handle varying page content
- When to use?
  - Look like one thing, deliberately designed; it should be easy to use and navigate
- Why?
  - users know where they are and where to find things

The Most Famous Example…



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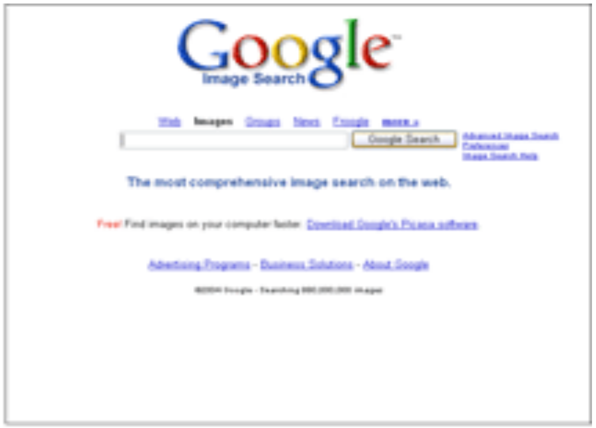

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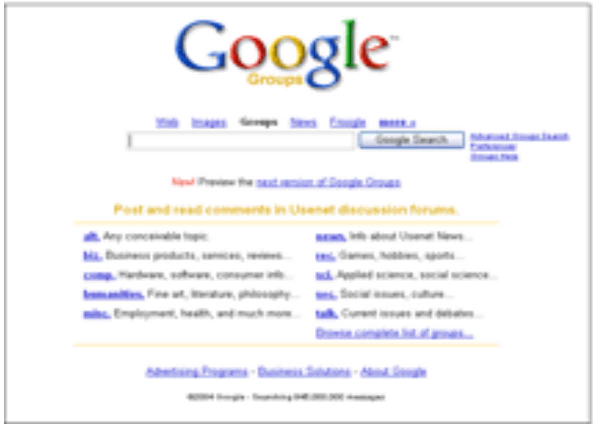

New! Preview the next version of Google Groups

Post and read comments in Usenet discussion forums.

alt. Any conceivable topic.	**news.** Info about Usenet News...
biz. Business products, services, reviews...	**rec.** Games, hobbies, sports...
comp. Hardware, software, consumer info...	**sci.** Applied science, social science...
humanities. Fine art, literature, philosophy...	**soc.** Social issues, culture...
misc. Employment, health, and much more...	**talk.** Current issues and debates...
	Browse complete list of groups...

Advertising Programs - Business Solutions - About Google

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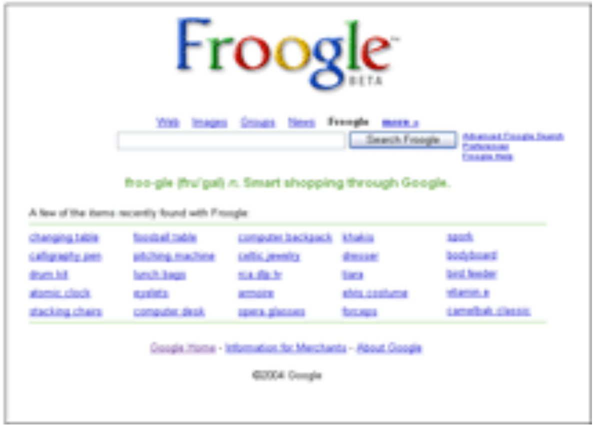


froo-gle (fru'gal) *n.* Smart shopping through Google.

A few of the items recently found with Froogle:

changing table	foosball table	computer backpack	khakis	spork
calligraphy pen	pitching machine	celtic jewelry	dresser	bodyboard
drum kit	lunch bags	[illegible]	tiara	bird feeder
atomic clock	eyelets	armoire	elvis costume	vitamin e
stacking chairs	computer desk	opera glasses	forceps	camelbak classic

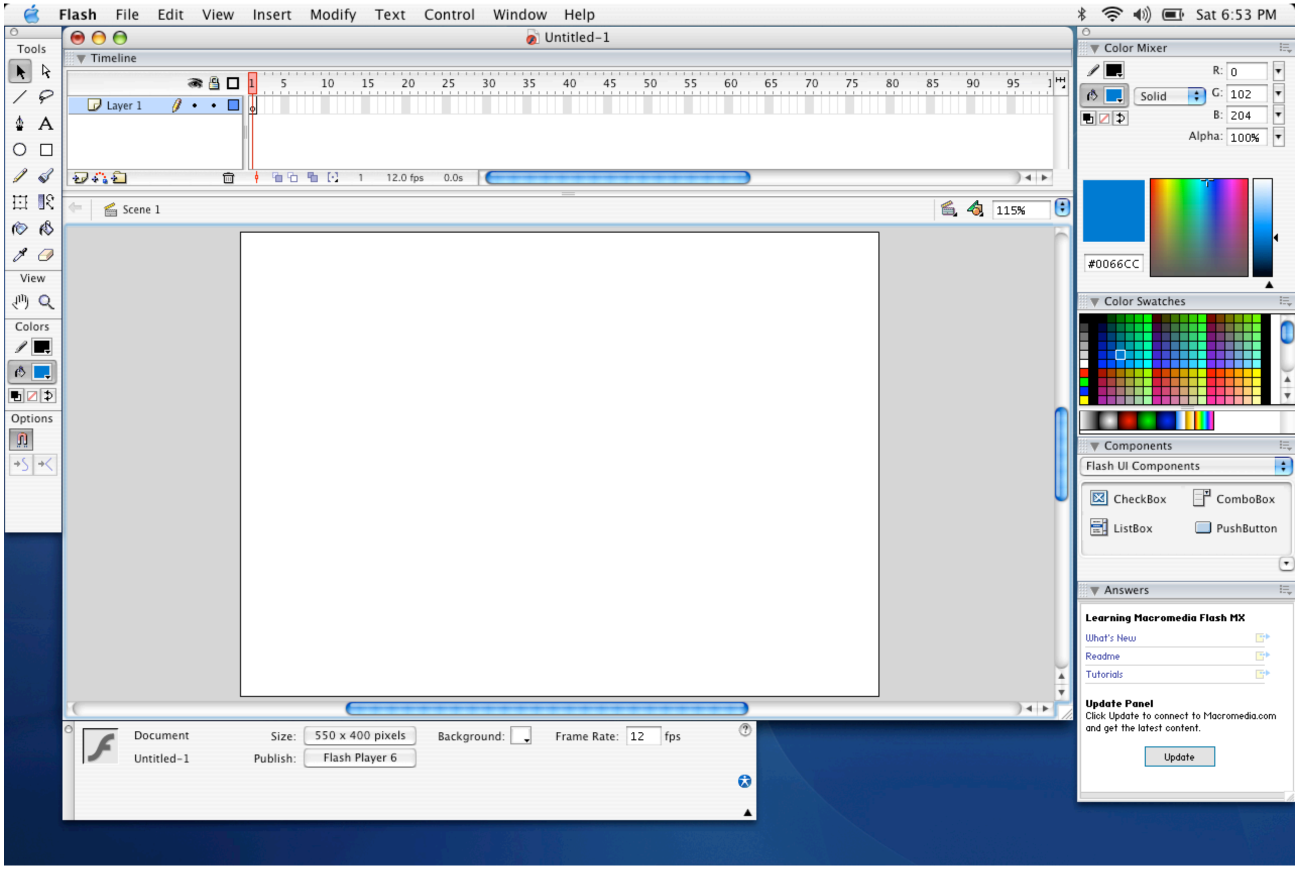
Google Home - Information for Merchants - About Google

©2004 Google

Clear Entry Points

- Google's interface presents few, clear, task-oriented entry points
  - Useful for novice, infrequent users
  - "Instant gratification"

Center Stage



R: 0
G: 102
B: 204
Alpha: 100%
#0066CC

Update Panel
Click Update to connect to Macromedia.com and get the latest content.

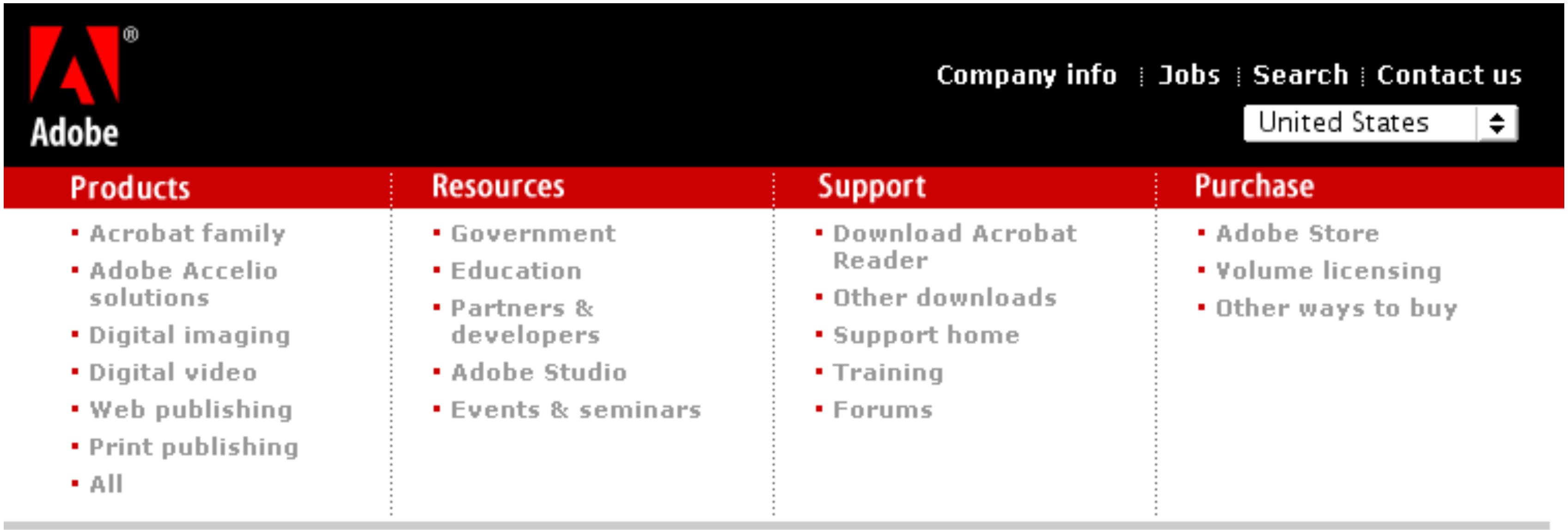
Document
Untitled-1

Size: 550 x 400 pixels
Publish: Flash Player 6
Background:
Frame Rate: 12 fps

Center Stage

- Put the most important part of the UI into the largest subsection of the page or window; cluster secondary tools and content around it in smaller panels
- Why?
  - You should *guide* the user's eyes immediately to the start of the most important information (or task)

Titled sections



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- Other downloads
- Support home
- Training
- Forums

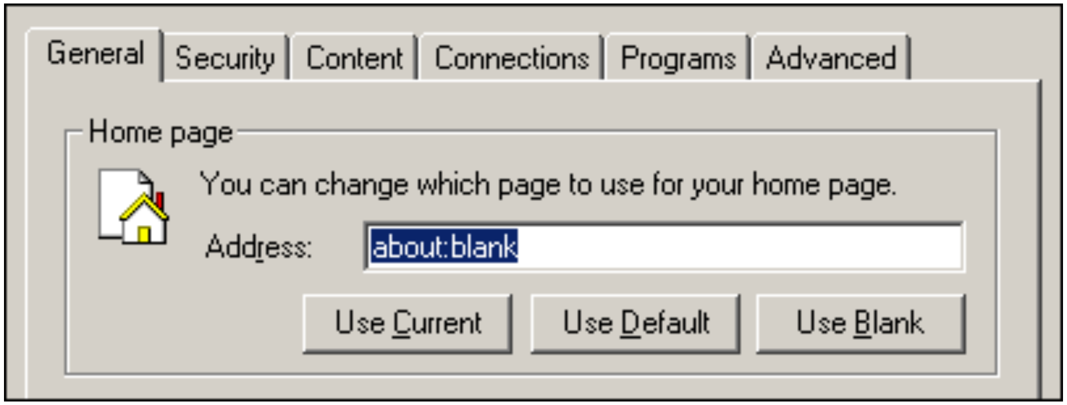
Purchase

- Adobe Store
- Volume licensing
- Other ways to buy

Titled sections

- Define separate sections of content by giving each one a visually strong title, and then laying them all out on the page together
- When to use?
  - There's a lot of content on the page, but you want to make the page easy to scan and understand
    - You can group the content into thematic or task-based sections that make sense to the user.
- Why?
  - It makes the information architecture obvious
  - The human visual system always looks for bigger patterns, whether they're deliberate or not

Card Stack



Home page

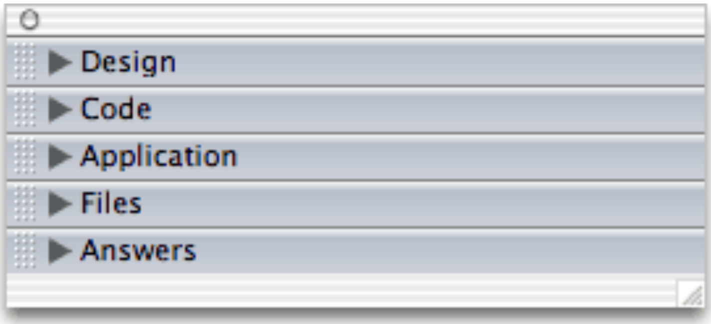
You can change which page to use for your home page.

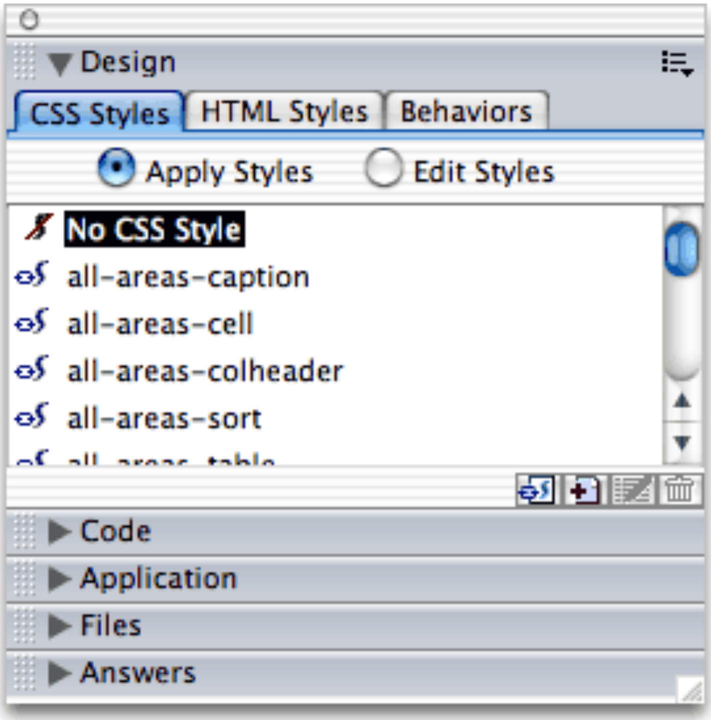
Address: about:blank

Card Stack

- When to use?
  - There's too much material on the page
  - the user's attention becomes distracted
- Why?
  - The labeled "cards" structure the content into easily-digestible chunks, each of which is now understandable at a glance

Closable panels

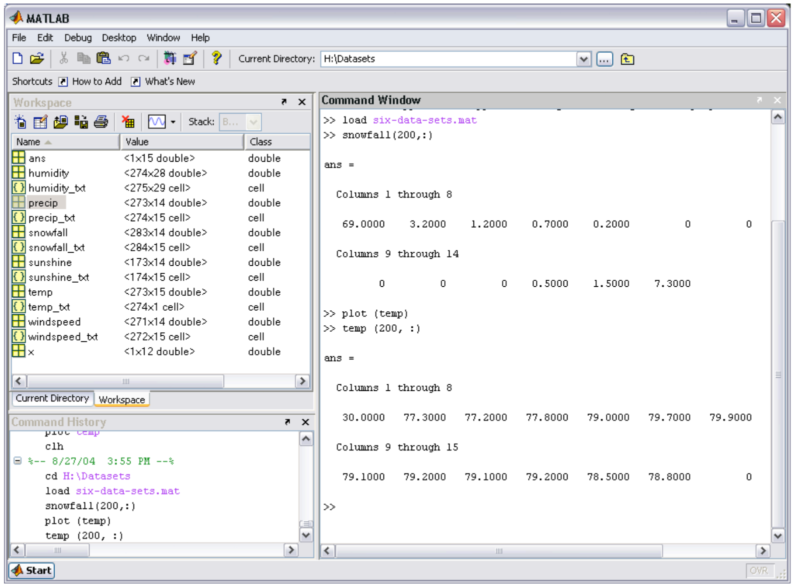




Closable panels

- Put sections of content onto separate panels, and let the user open and close each of them separately from the others
- When to use?
  - There's too much stuff to present on the page, but you want it all only one click away
  - Titled sections, card stacks, extras on demand
- Why?
  - It can contain sections of **wildly differing sizes.**
  - The user can open **several sections at once.**

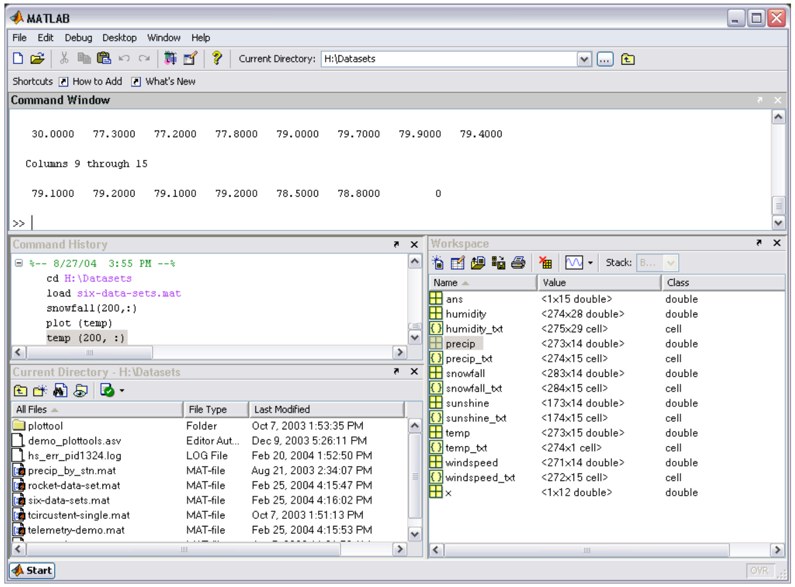
Movable panels


MATLAB
File Edit Debug Desktop Window Help
Current Directory: H:\Datasets
Shortcuts How to Add What's New
Workspace
Stack: B...
Current Directory
Workspace
Command History
Command Window
Start
OVR

Name	Value	Class
ans	<1x15 double>	double
humidity	<274x28 double>	double
humidity_txt	<275x29 cell>	cell
precip	<273x14 double>	double
precip_txt	<274x15 cell>	cell
snowfall	<283x14 double>	double
snowfall_txt	<284x15 cell>	cell
sunshine	<173x14 double>	double
sunshine_txt	<174x15 cell>	cell
temp	<273x15 double>	double
temp_txt	<274x1 cell>	cell
windspeed	<271x14 double>	double
windspeed_txt	<272x15 cell>	cell
x	<1x12 double>	double

```
    plot temp
    clh
%-- 8/27/04  3:55 PM --%
    cd H:\Datasets
    load six-data-sets.mat
    snowfall(200,:)
    plot (temp)
    temp (200, :)
```

```
>> load six-data-sets.mat
>> snowfall(200,:)

ans =

  Columns 1 through 8

   69.0000    3.2000    1.2000    0.7000    0.2000         0         0

  Columns 9 through 14

         0         0         0    0.5000    1.5000    7.3000

>> plot (temp)
>> temp (200, :)

ans =

  Columns 1 through 8

   30.0000   77.3000   77.2000   77.8000   79.0000   79.7000   79.9000

  Columns 9 through 15

   79.1000   79.2000   79.1000   79.2000   78.5000   78.8000         0

>>
```


MATLAB
File Edit Debug Desktop Window Help
Current Directory: H:\Datasets
Shortcuts How to Add What's New
Command Window
Command History
Current Directory - H:\Datasets
Workspace
Stack: B...
Start
OVR

```
   30.0000   77.3000   77.2000   77.8000   79.0000   79.7000   79.9000   79.4000

  Columns 9 through 15

   79.1000   79.2000   79.1000   79.2000   78.5000   78.8000         0

>>
```

```
%-- 8/27/04  3:55 PM --%
    cd H:\Datasets
    load six-data-sets.mat
    snowfall(200,:)
    plot (temp)
    temp (200, :)
```

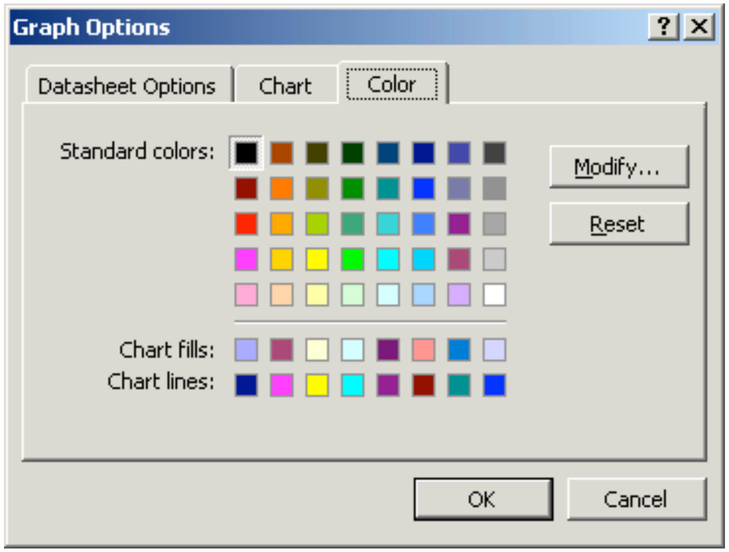
All Files	File Type	Last Modified
plottool	Folder	Oct 7, 2003 1:53:35 PM
demo_plottools.asv	Editor Aut...	Dec 9, 2003 5:26:11 PM
hs_err_pid1324.log	LOG File	Feb 20, 2004 1:52:50 PM
precip_by_stn.mat	MAT-file	Aug 21, 2003 2:34:07 PM
rocket-data-set.mat	MAT-file	Feb 25, 2004 4:15:47 PM
six-data-sets.mat	MAT-file	Feb 25, 2004 4:16:02 PM
tcircustent-single.mat	MAT-file	Oct 7, 2003 1:51:13 PM
telemetry-demo.mat	MAT-file	Feb 25, 2004 4:15:53 PM

Name	Value	Class
ans	<1x15 double>	double
humidity	<274x28 double>	double
humidity_txt	<275x29 cell>	cell
precip	<273x14 double>	double
precip_txt	<274x15 cell>	cell
snowfall	<283x14 double>	double
snowfall_txt	<284x15 cell>	cell
sunshine	<173x14 double>	double
sunshine_txt	<174x15 cell>	cell
temp	<273x15 double>	double
temp_txt	<274x1 cell>	cell
windspeed	<271x14 double>	double
windspeed_txt	<272x15 cell>	cell
x	<1x12 double>	double

Movable panels

- When to use?
  - Allow users to configure
  - You may want users to feel some sense of ownership of the software, or at least have fun playing with it
- Why?
  - people like to rearrange their environment to suit their working style

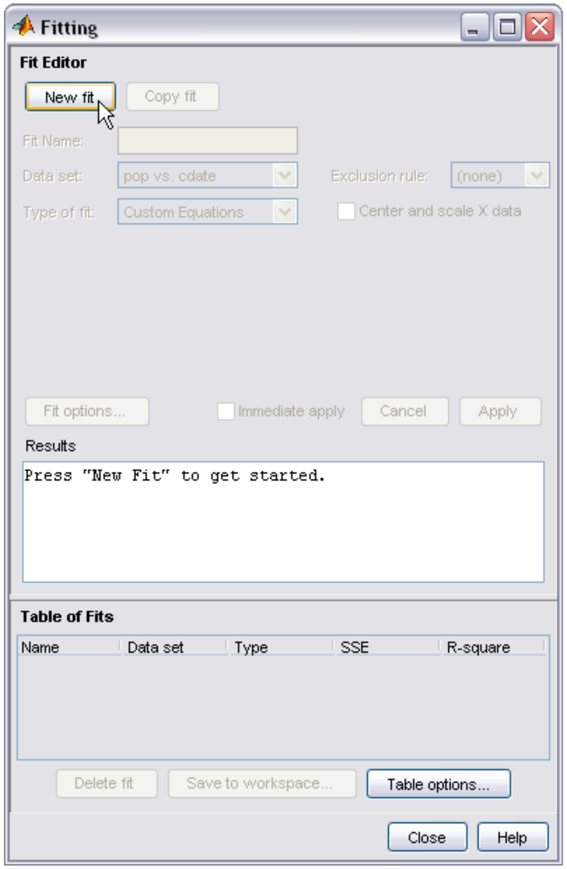
Diagonal balance



Diagonal balance

- Arrange page elements in an asymmetric fashion, but balance it by putting visual weight into both the upper-left and lower-right corners
- Why?
  - contribute to a balanced composition on the screen
  - an ideal visual flow for users who speak left-to-right languages

Progressive Enabling



Fit Name:

Data set: pop vs. cdate

Exclusion rule: (none)

Type of fit: Custom Equations

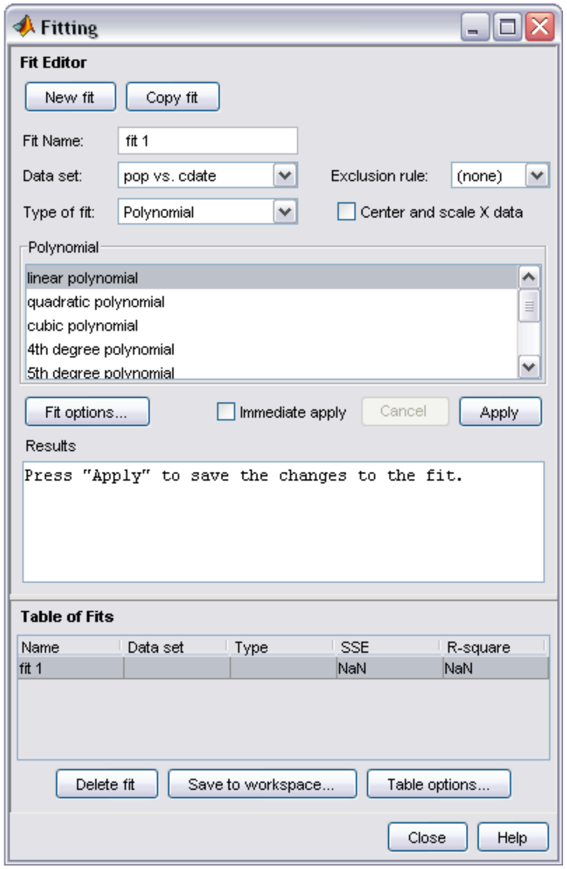
□ Center and scale X data

Results

```
Press "New Fit" to get started.
```

Table of Fits

Name	Data set	Type	SSE	R-square



Fit Name: fit 1

Data set: pop vs. cdate

Exclusion rule: (none)

Type of fit: Polynomial

□ Center and scale X data

Polynomial

- linear polynomial
- quadratic polynomial
- cubic polynomial
- 4th degree polynomial
- 5th degree polynomial

Results

```
Press "Apply" to save the changes to the fit.
```

Table of Fits

Name	Data set	Type	SSE	R-square
fit 1			NaN	NaN

Progressive Enabling

- Starting with a UI that's mostly disabled, guide a user through a series of steps by enabling more of the UI as each step is done
- When to use?
  - You don't want to force the user to go page by page at each step
    - you'd like to keep the whole interface on one page
- Why?
  - The UI itself tells the possible consequences of some choices
    - if I turn this checkbox on, then I have to fill in these four text fields that just got enabled
  - The user can't do things that would get him/her into trouble

UI patterns

- Traditionally learned from experience
- Good to have standard names
- Good to have catalog to jog memory
- Still takes practice

Acknowledgements

- Many slides courtesy of Rupak Majumdar