

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation!

Lecture 15: Interface Implementation

Instructor: Amy Zhang, 2/23/2021

Today's Topics

- UI Hall of Fame and Shame
- Where are we now?
- Interface Implementation
 - UI toolkits
 - Design patterns
- Any remaining class time for group work on 3c

UI Hall of Fame and Shame

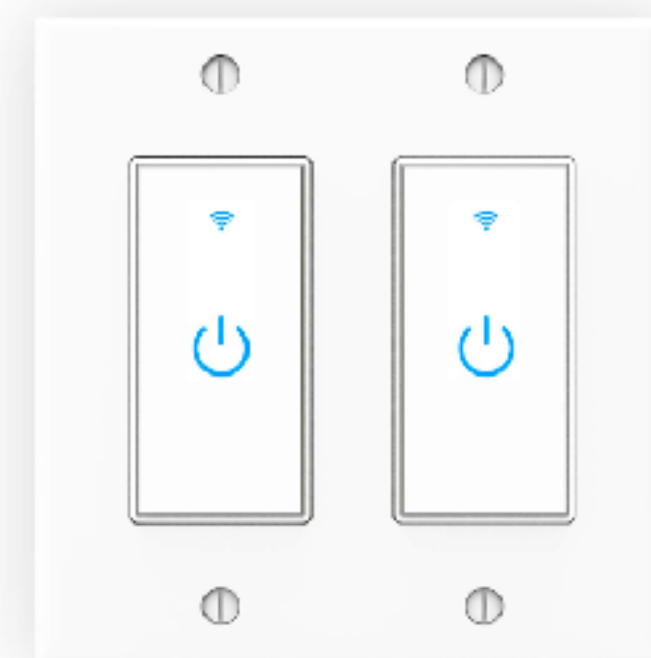
The "internet of things"

In other words, connect all your devices and appliances to the internet!

Pros? Cons?



IDEAING SmartTOILET
THE REVOLUTION IS IN YOUR BATHROOM



Internet of Shit
@internetofshit

The future, when bins need instructions



8:59 AM · Jun 1, 2016

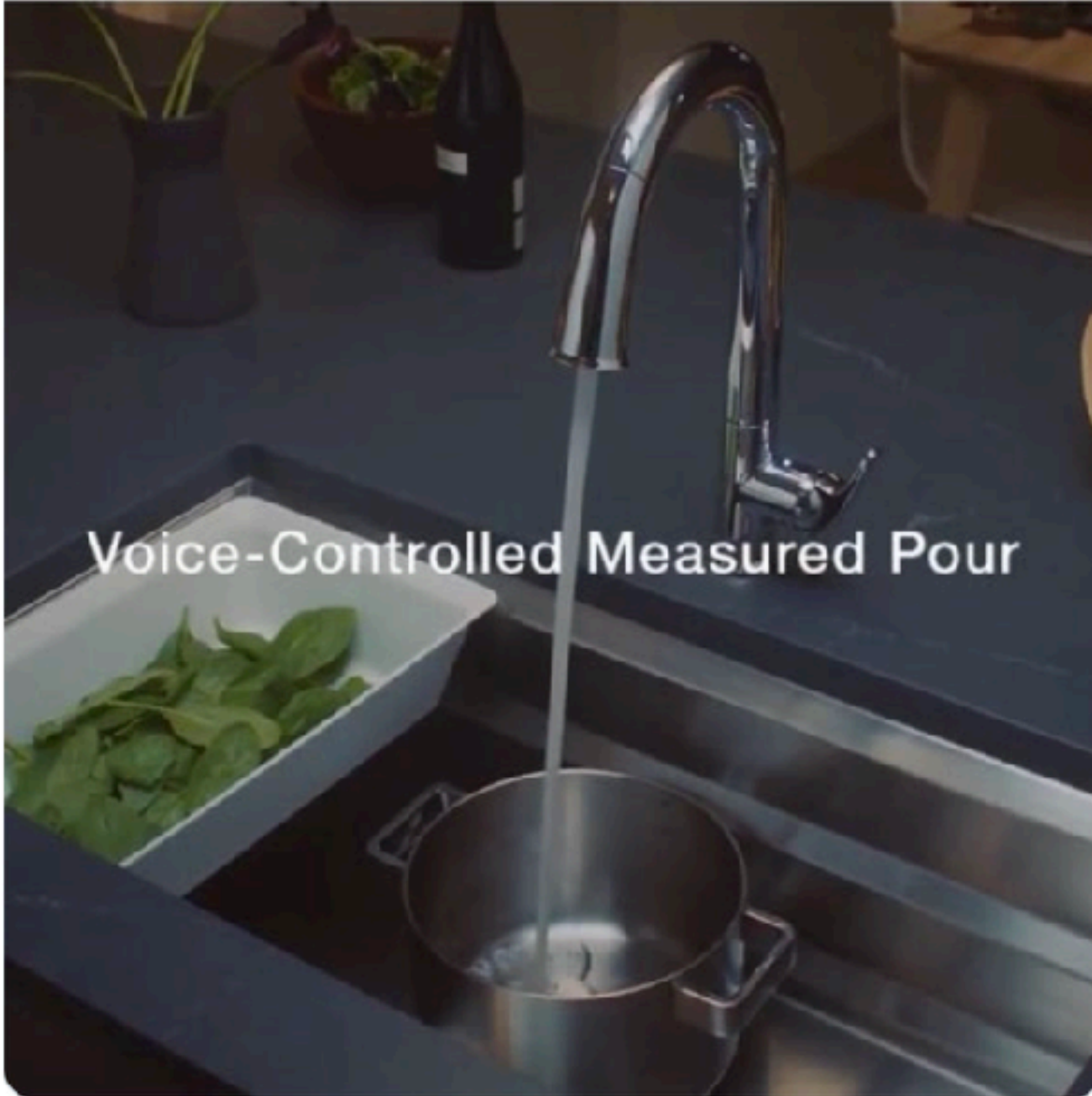
260 likes, 231 replies

Copy link to Tweet

Internet of Shit
@internetofshit

looking forward to yelling STOP, PLEASE STOP at all four corners of my smart kitchên

KOHLER Sponsored



Voice-Controlled Measured Pour

Internet of Shit
@internetofshit

Wifi's down so the cat is stuck outside

Paul's Hardware @paulhardware
It's a WiFi pet door that will only open if your dog/cat has a passport key... 🐾



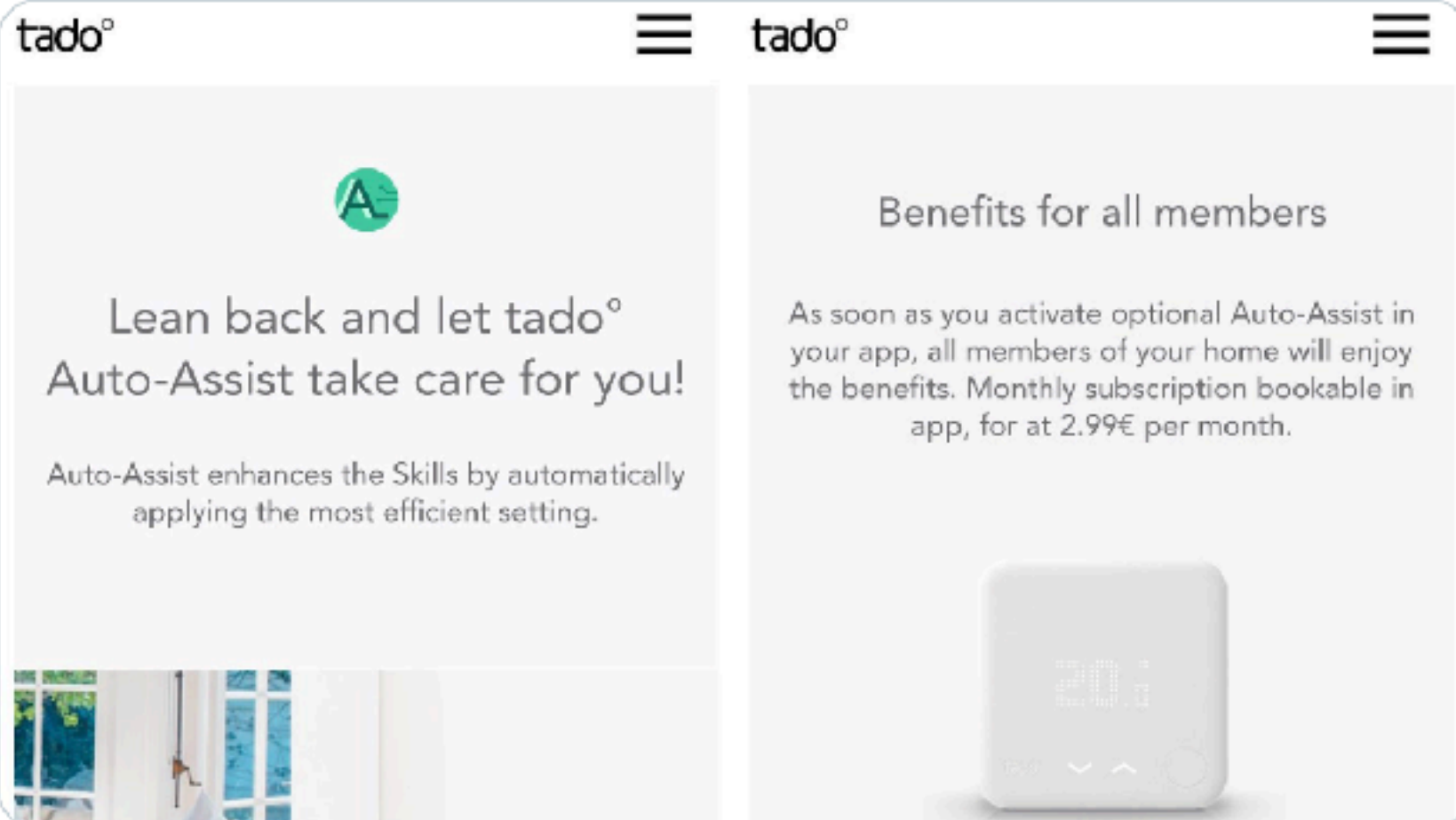
11:48 AM · May 14, 2016

319 likes, 278 replies

Copy link to Tweet

Internet of Shit
@internetofshit

PAY US OR YOUR HOUSE WILL BE COLD AT INCONVENIENT TIMES



Benefits for all members

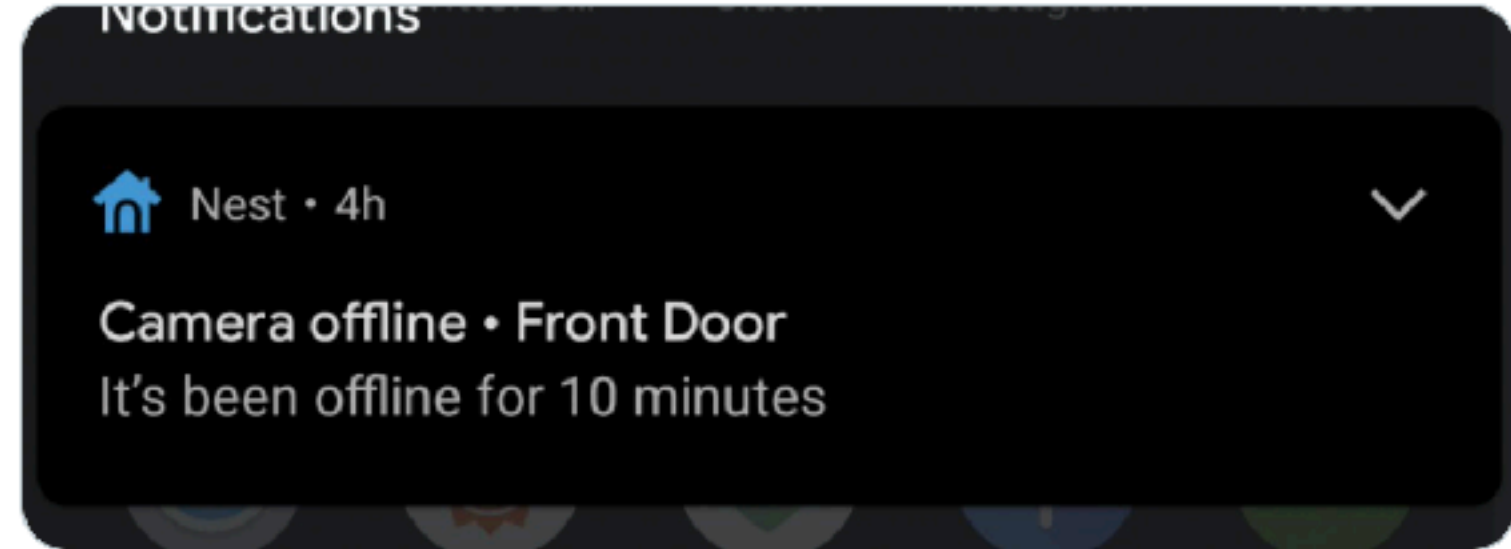
As soon as you activate optional Auto-Assist in your app, all members of your home will enjoy the benefits. Monthly subscription bookable in app, for at 2.99€ per month.

Lean back and let tado° Auto-Assist take care for you!

Auto-Assist enhances the Skills by automatically applying the most efficient setting.

Internet of Shit @internetofshit · Dec 14, 2020

if anyone wants to rob my house, doing it while Google is down would make it easy



Notifications

Nest · 4h

Camera offline • Front Door
It's been offline for 10 minutes

Where are we now?


Looking Forward

- Your blog posts are up!! <https://cse440.medium.com/> Check out other groups' work!
- **Last 2 steps of the design process** (for this course at least)
 - 3c - usability testing, this week
 - 3d, 3e - two iterations of digital mockups, next week (**3d will be released after lecture today**)
- Remainder of class:
 - **Exam**
 - Next Thursday in lecture over Zoom, open book and notes, covering the topics from lectures
 - Exam prep and Q&A on Tuesday
 - I'm already aware of DRS accommodations for students, and we will be emailing those students about our plan for accommodations for the exam
 - **Presenting your work**
 - another blog post (3e), with both blog posts featured on our course website and on Medium
 - Assignment 4a, 4b: culminating in final pitches on the last day of class to a panel of judges

UI Toolkits

Sequential Programs

- Program takes control, prompts for input
- Person waits on the program
- Program says when it is ready for more input, which the person then provides



```
C:\Windows\system32\cmd.exe
C:\>dir
Volume in drive C has no label.
Volume Serial Number is 8CE2-D369

Directory of C:\
09/25/2006  01:08 PM                24 autoexec.bat
09/25/2006  01:08 PM                10 config.sys
10/13/2006  01:43 PM                <DIR>      DELL
01/05/2002  02:38 AM                54,784 msoci70.dll
10/17/2006  01:41 AM                <DIR>      Perl
10/29/2006  11:41 PM                <DIR>      Program Files
10/13/2006  04:41 PM                <DIR>      ProgramDataTechSmith
10/13/2006  02:24 PM                <DIR>      Users
10/21/2006  06:04 PM                <DIR>      Windows
10/13/2006  05:58 PM                <DIR>      Windows.old
10/13/2006  03:40 PM                146 YServer.txt
                4 File(s)          54,964 bytes
                7 Dir(s)      24,839,090,176 bytes free

C:\>ls -l
ls: reading directory .: Permission denied
total 472
drw-rw-rw-  5 Ajit 0   4096 2006-10-13 15:24 $Recycle.Bin
-rwxrwxrwx  1 Ajit 0    24 2006-09-25 14:00 autoexec.bat
drw-rw-rw- 26 Ajit 0   4096 2006-10-13 19:07 Boot
-rw-rw-rw-  1 Ajit 0    353 2006-10-13 14:57 Boot.BAK
-r--r--r--  1 Ajit 0    353 2006-10-13 19:07 Boot.ini.saved
-r--r--r--  1 Ajit 0 438328 2006-10-04 03:02 bootmgr
-r--r--r--  1 Ajit 0   8192 2006-10-13 19:07 BOOTSECT.BAK
drw-rw-rw-  2 Ajit 0     0 2006-10-24 23:34 Config.Msi
-rw-rw-rw-  2 Ajit 0    10 2006-09-25 14:00 config.sys
drw-rw-rw-  3 Ajit 0   4096 2006-10-13 14:43 DELL
dr--r--r--  2 Ajit 0   4096 2006-10-13 15:24 Documents and Settings

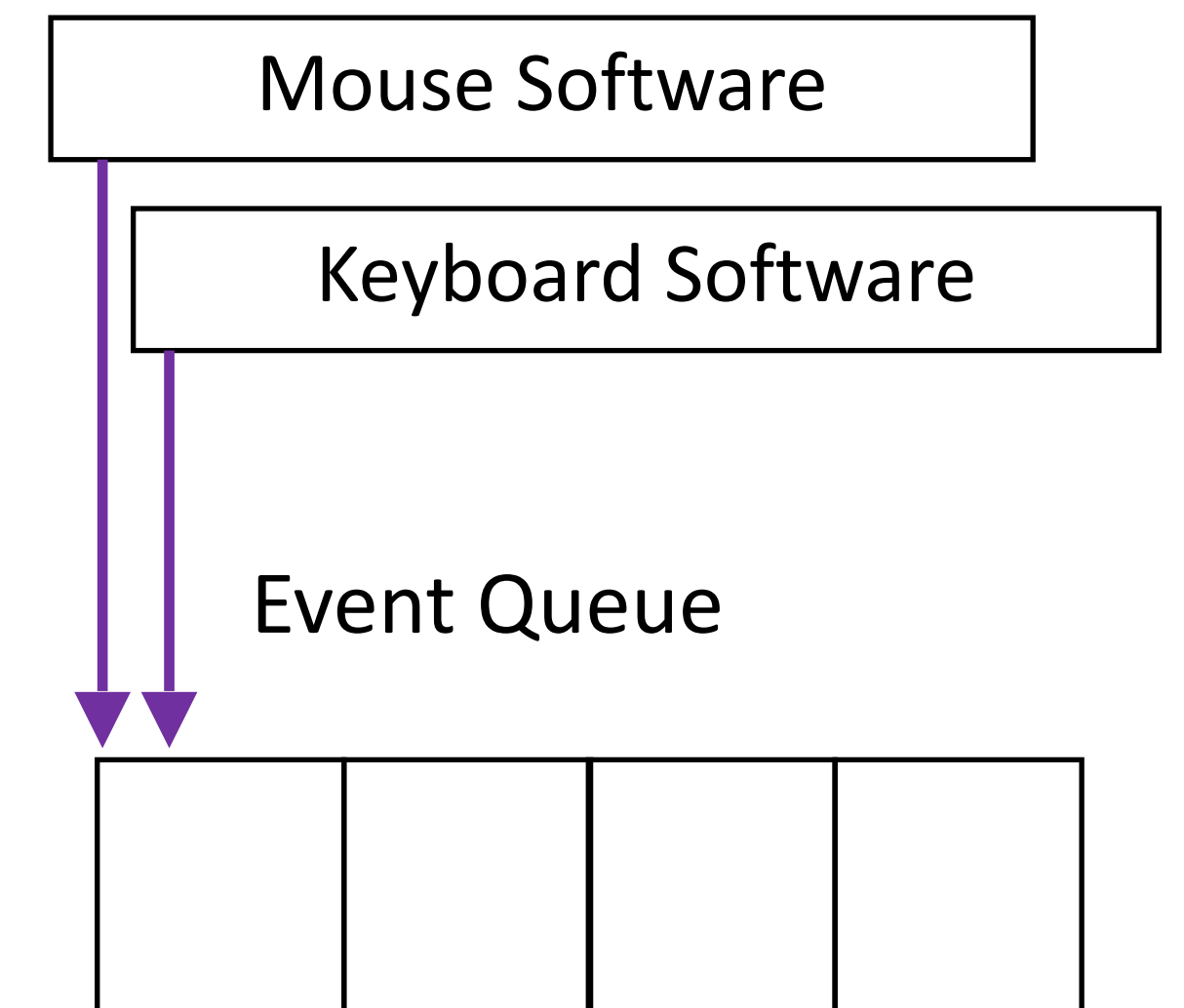
C:\>
```

Sequential Programs: basic software loop

```
while true {  
    print "Prompt for Input"  
    input = read_line_of_text()  
    output = do_work(input)  
    print output  
}
```

Event-Driven Programs

- Flow of the program execution is determined by **events**
 - User interaction: “mouse down”, “item drag”, “key up”
 - Also messages from operation system, etc.
- All events go into a queue
 - Ensures events are handled in order
- How many event queues does your operating system have?
 - One per top-level application!



Event-Driven Programs: basic software loop

```
do {  
    e = read_event()  
    dispatch_event(e)  
    update_display()  
} while (e.type != QUIT)
```



Input



Processing



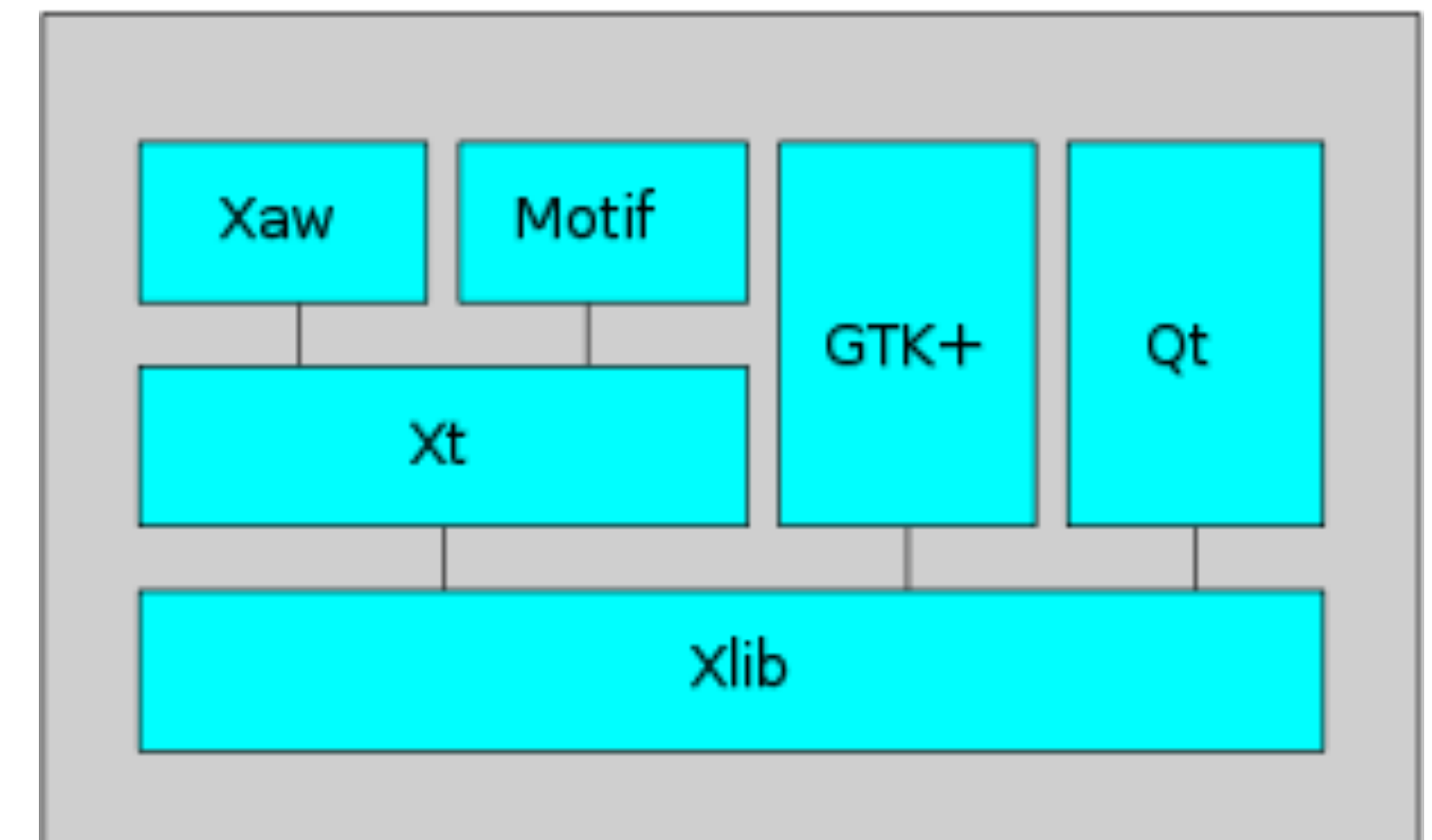
Output

Event-Driven Programs: basic software loop

In the 1990s:

“One of the most complex aspects of Xlib programming is designing the event loop, which must take into account all of the possible events that can occur in a window.”

Nye & O'Reilly, X Toolkit Intrinsic Programming Manual, vol. 4, 1990, p. 241.



Toolkits

We use **toolkits** because they:

- Identify common or important practices

- Package those practices into a framework

- Make it easy to follow those practices

- Make it easier to focus on our application

What other benefits?

- Faster = more iterative design

- Implementation is generally better in the tool

- Consistency across applications using same tool

Example: Web toolkits

Raw event handling and Document Object Model (DOM) manipulation via JavaScript

```
var myElementsArray = document.querySelectorAll( '.btn' );
myElementsArray.forEach( function( element, index {
    element.addEventListener( "click", function() {
        //inside my click event!
    } ) ;
} ) ;
```

Example: Web toolkits

One level up: JavaScript wrapper libraries like jQuery, which has predefined events for almost all DOM actions

```
$( '.btn' ).click(function () {  
    //inside my click event!  
});
```

Example: Web toolkits

Another level up:
interactions, widgets,
components, and
templates

Examples: jQuery UI,
Bootstrap, Semantic UI

<https://jqueryui.com/demos/>

jQuery UI Demos

jQuery UI offers a combination of interaction, effects, widgets, utilities, and themes designed to work well together or on their own. Play with the demos, view the source, [build a theme](#), read the [API documentation](#) and start using jQuery UI today.

Interactions

Interactions add basic mouse-based behaviors to any element. You can create sortable lists, resizable elements, drag & drop behaviors and more with just a few lines of code. Interactions also make great building blocks for more complex widgets and applications.

- [Draggable](#)
- [Droppable](#)
- [Resizable](#)
- [Selectable](#)
- [Sortable](#)

Widgets

Widgets are full-featured UI controls that bring the richness of desktop applications to the Web. All widgets provide a solid core with plenty of extension points for customizing behavior, as well as full theming support.

- [Accordion](#)
- [Autocomplete](#)
- [Button](#)
- [Checkboxradio](#)

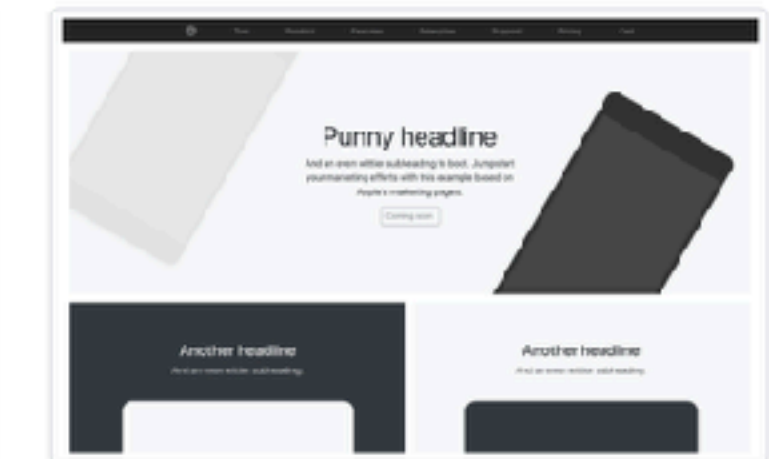
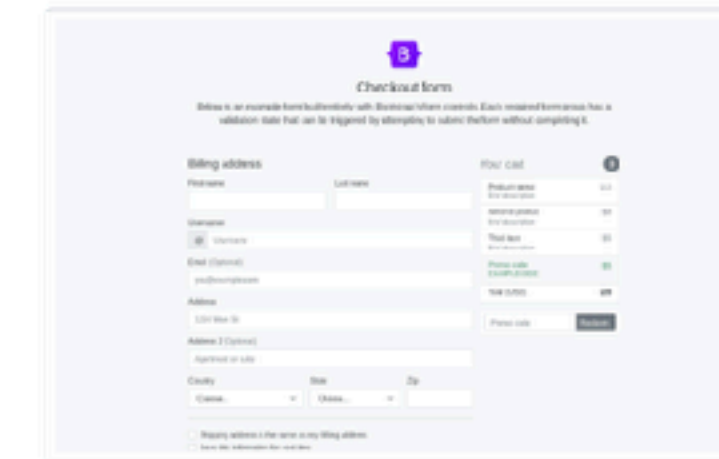
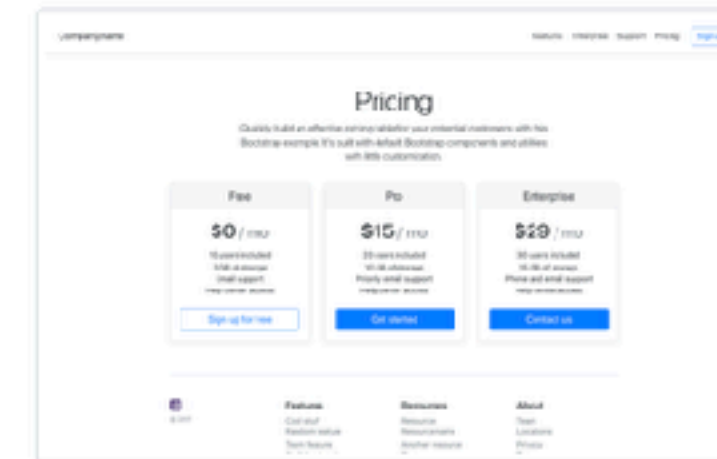
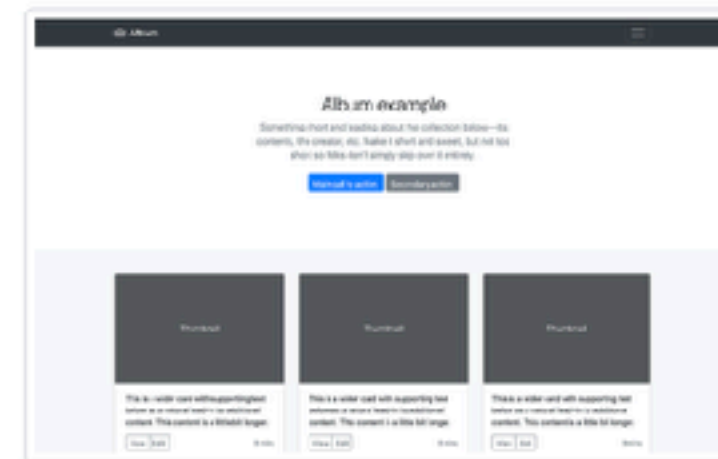
Example: Web toolkits

Another level up:
interactions, widgets,
components, and
templates

Examples: jQuery UI,
Bootstrap, Semantic UI

Custom Components

Brand new components and templates to help folks quickly get started with Bootstrap and demonstrate best practices for adding onto the framework.



[Album](#)

Simple one-page template for photo galleries, portfolios, and more.

[Pricing](#)

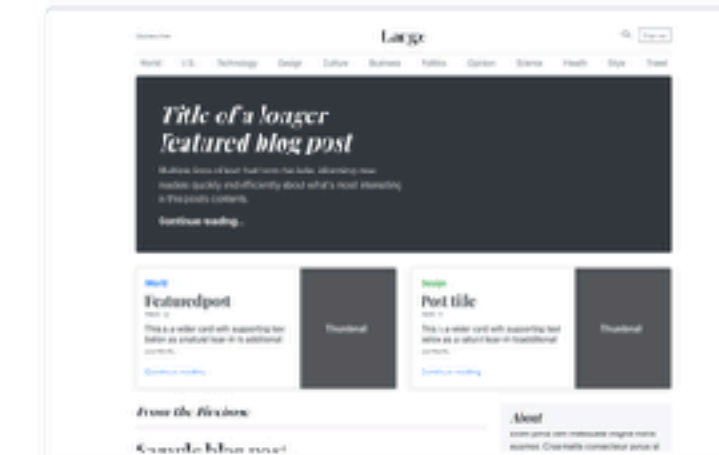
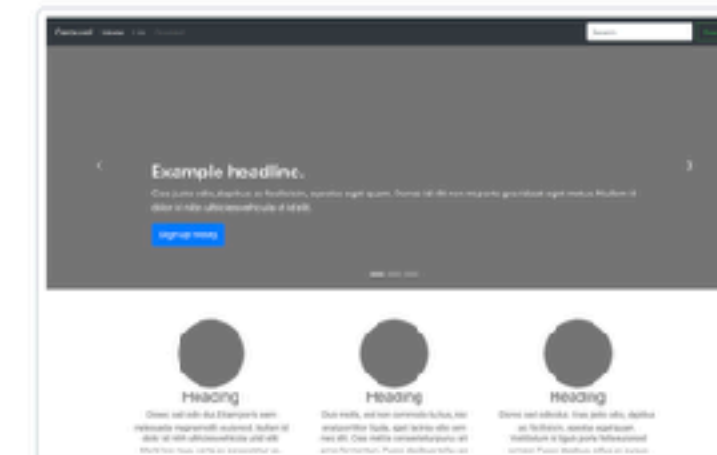
Example pricing page built with Cards and featuring a custom header and footer.

[Checkout](#)

Custom checkout form showing our form components and their validation features.

[Product](#)

Lean product-focused marketing page with extensive grid and image work.



[Cover](#)

A one-page template for building simple and beautiful home pages.

[Carousel](#)

Customize the navbar and carousel, then add some new components.

[Blog](#)

Magazine like blog template with header, navigation, featured content.

[Dashboard](#)

Basic admin dashboard shell with fixed sidebar and navbar.

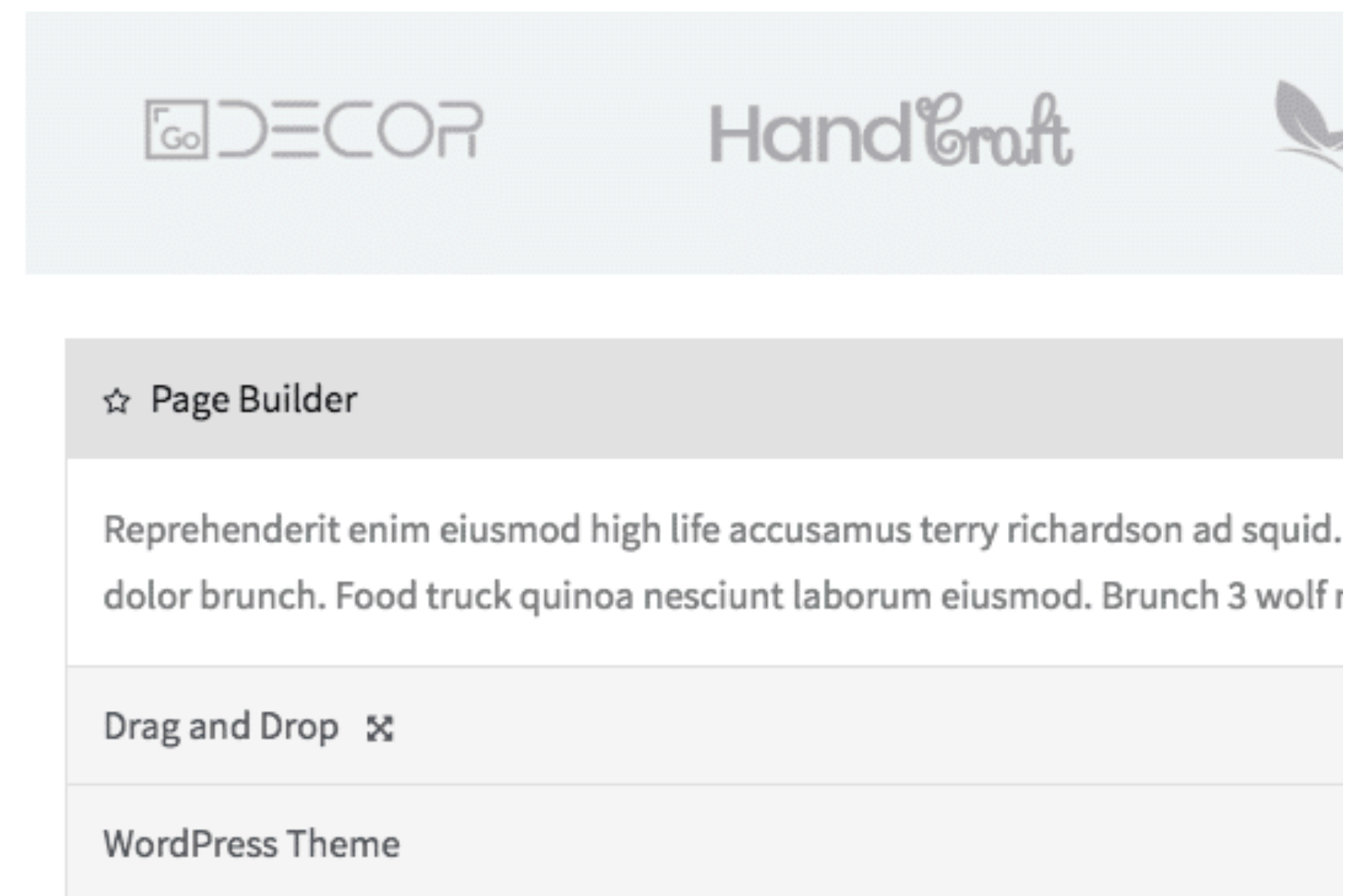
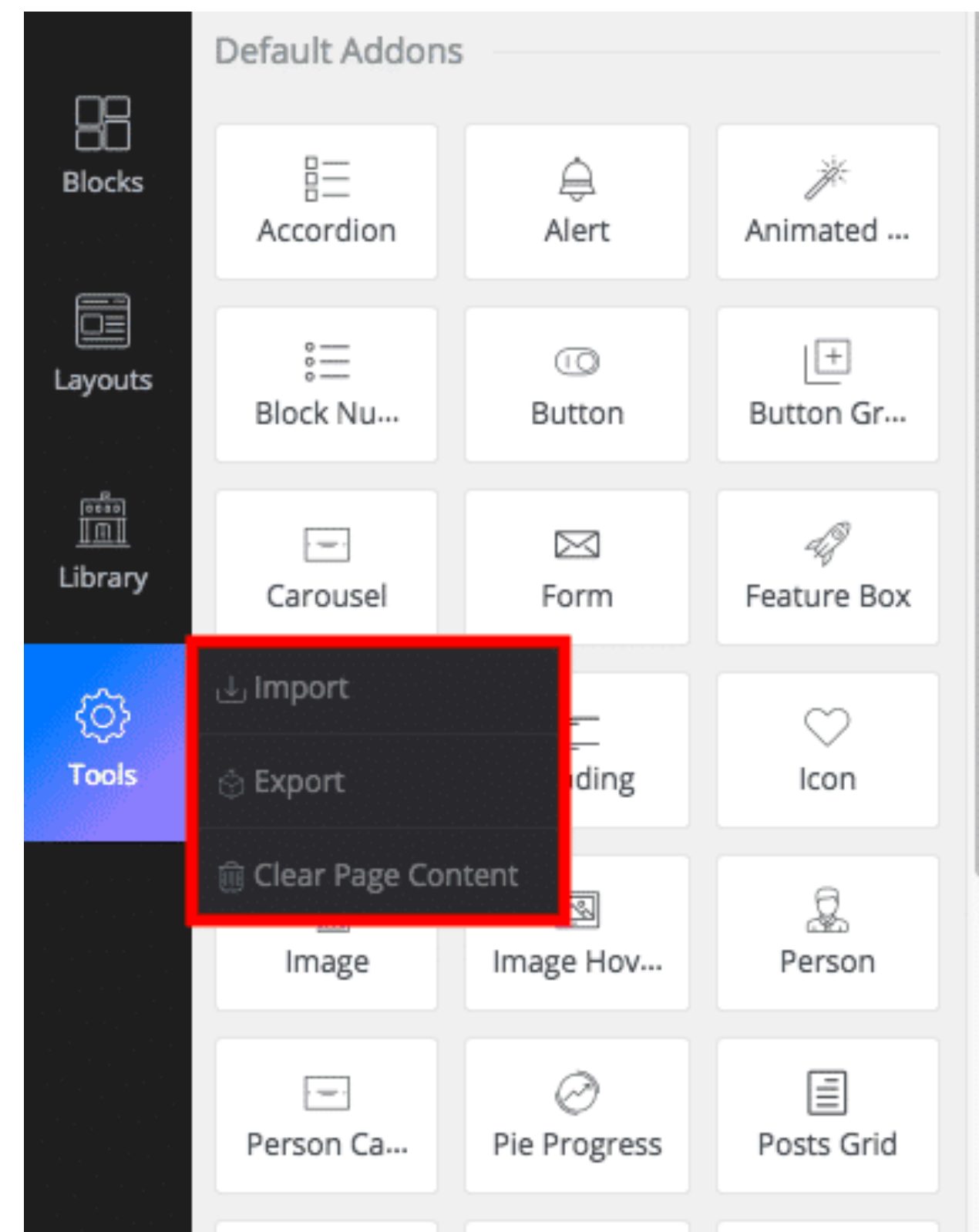


```
<button type="button" class="btn btn-primary">Pr
```

<https://getbootstrap.com/>

Example: Web toolkits

GUI Builder:
Adobe
Dreamweaver,
Wix, Wordpress,
Squarespace,
Weebly



Another example: interactive web visualization

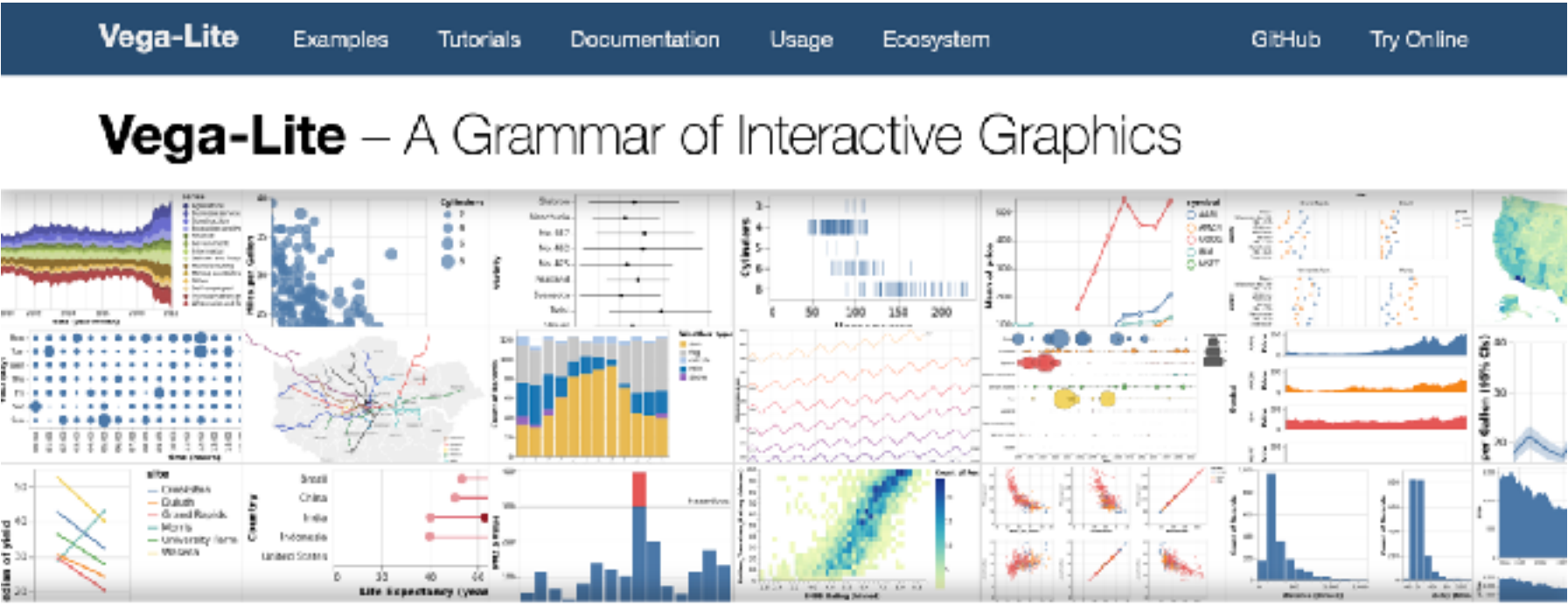
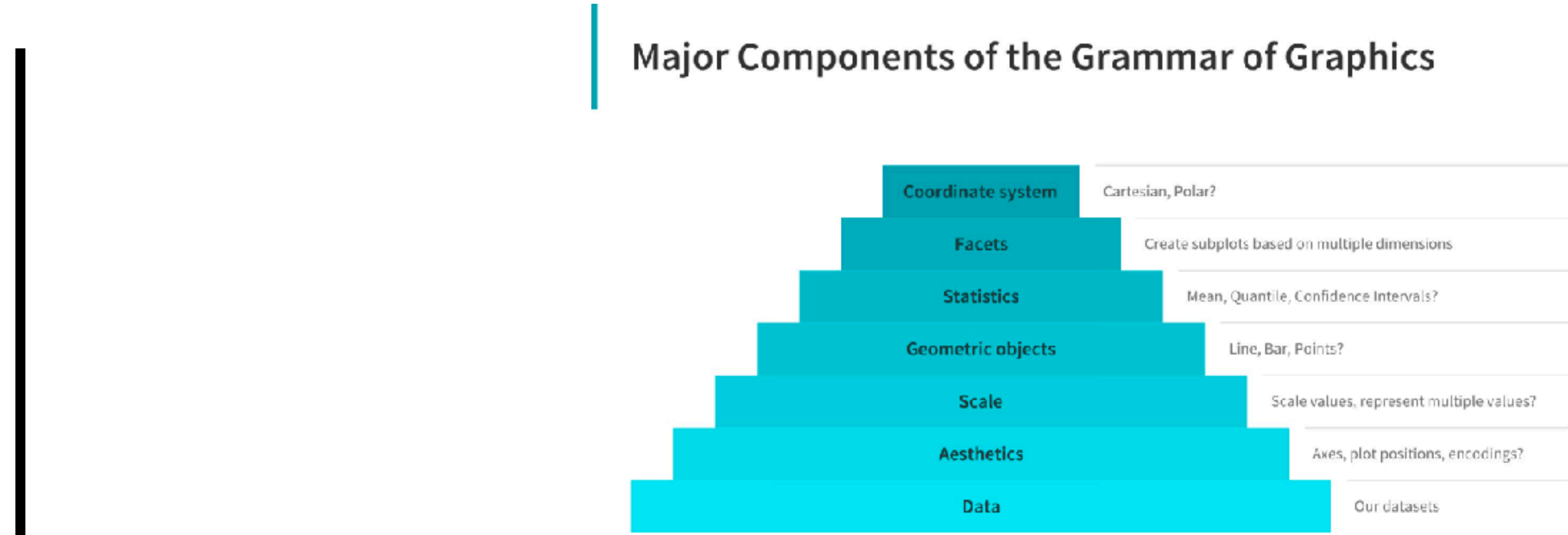
Raw JavaScript

d3.js (JavaScript library)

Vega (visualization grammar)

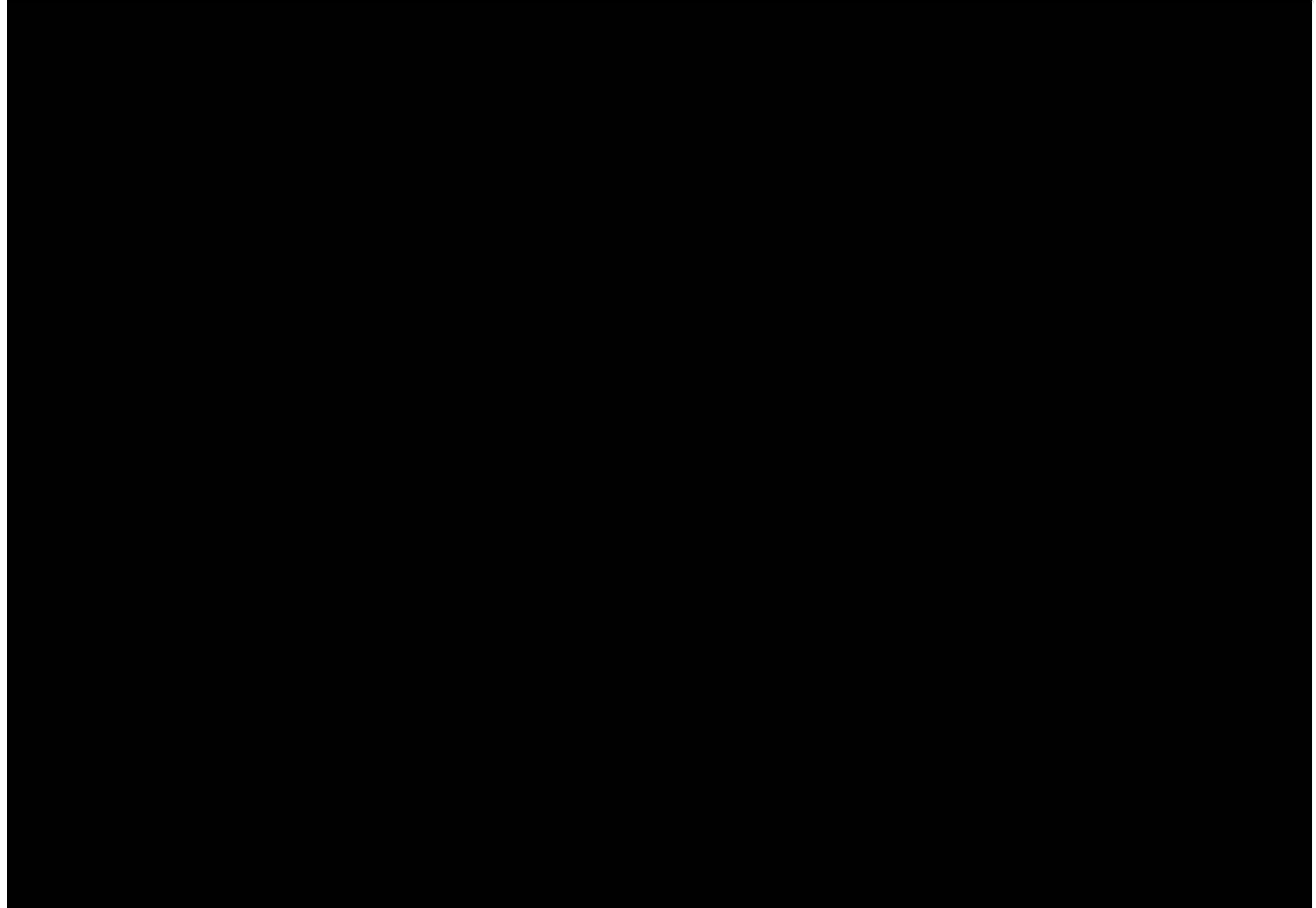
Vega-Lite (simplified grammar)

Voyager (web-based GUI builder)

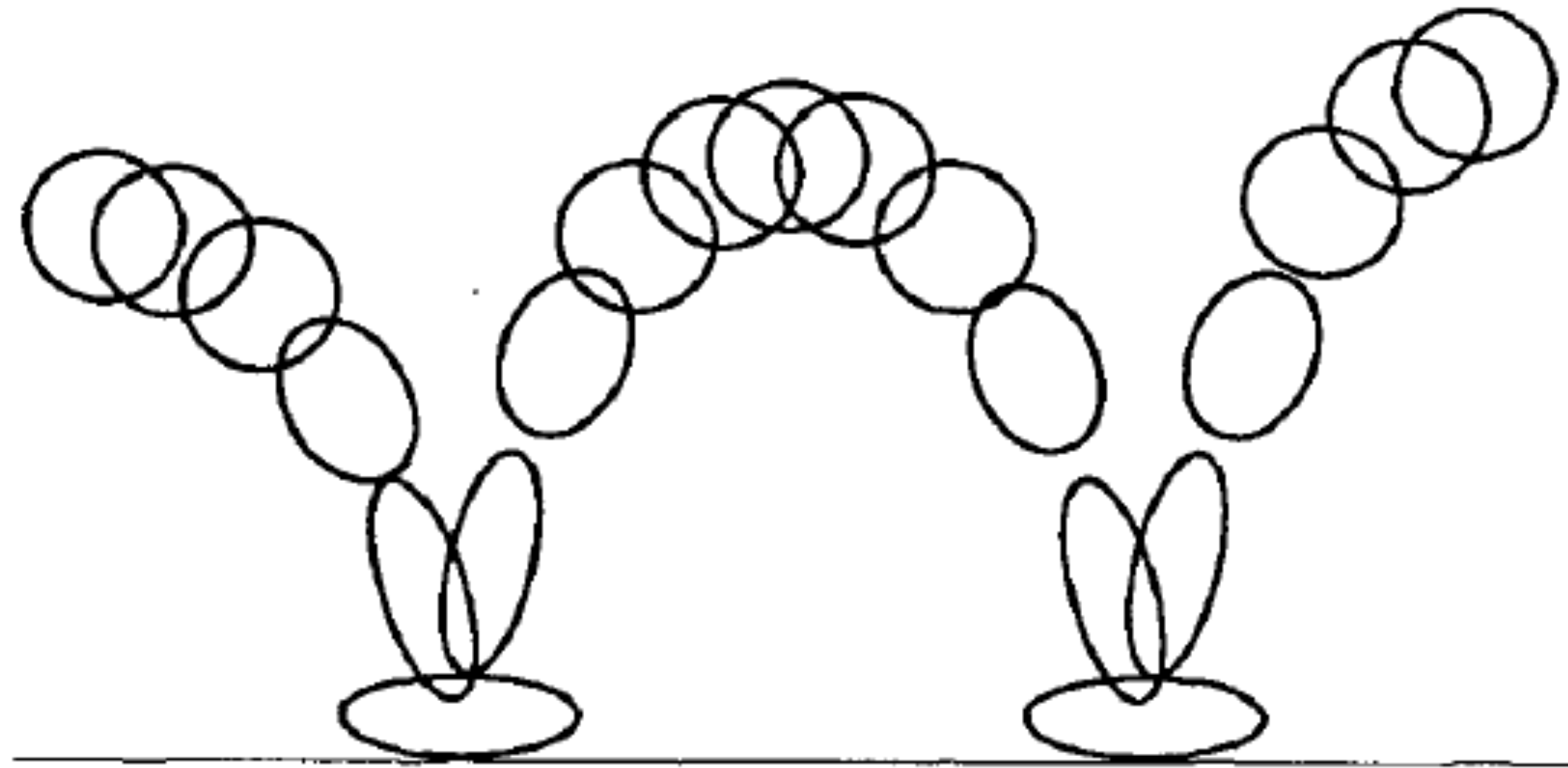


One more example: animation!

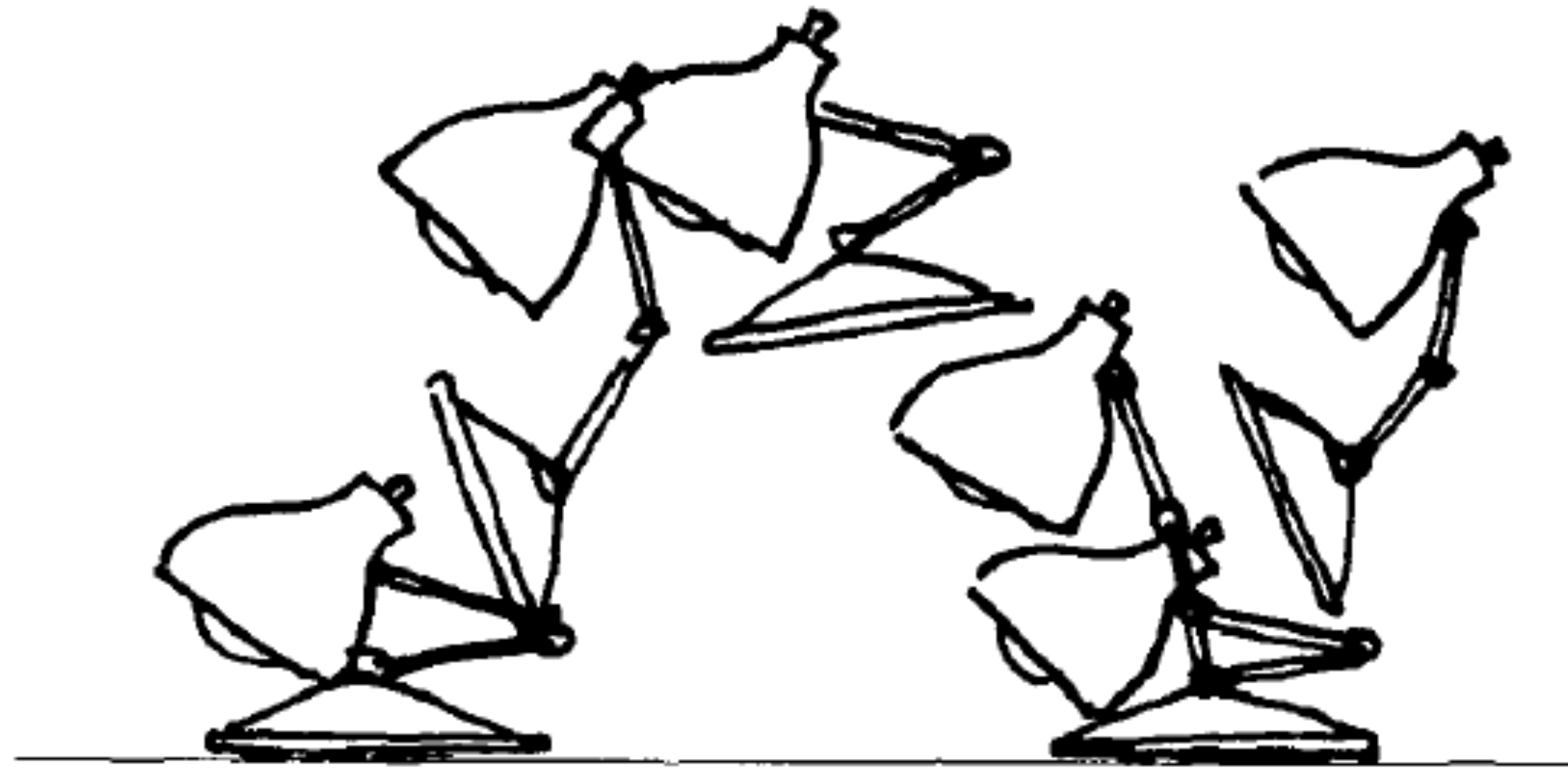
What are some common animation techniques you see here to convey something?



Squash and Stretch



Squash and Stretch



Squash and Stretch

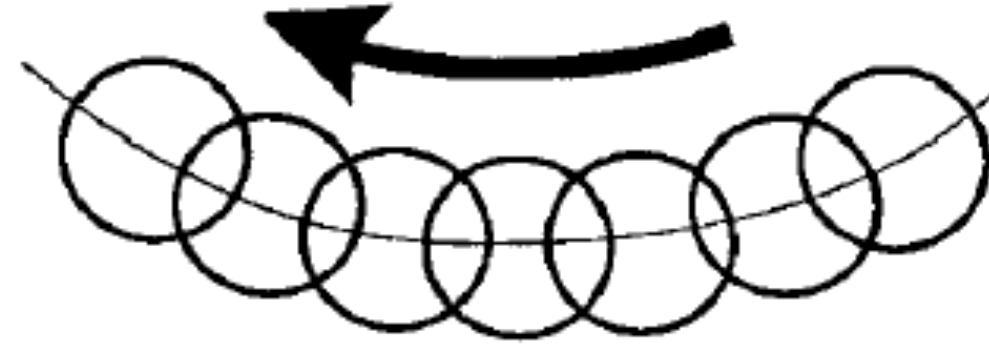


FIGURE 4a. In slow action, an object's position overlaps from frame to frame which gives the action a smooth appearance to the eye.

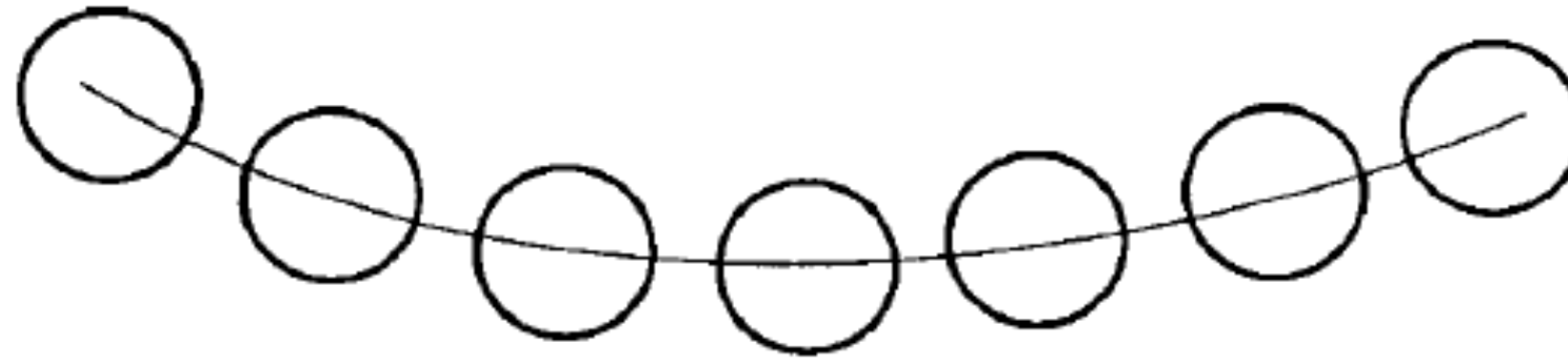


FIGURE 4b. Strobic occurs in a faster action when the object's positions do not overlap and the eye perceives separate images.

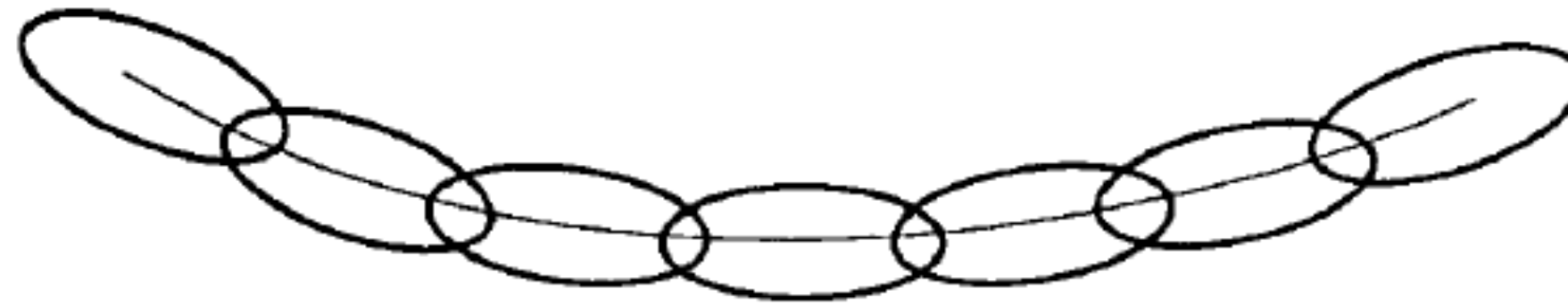
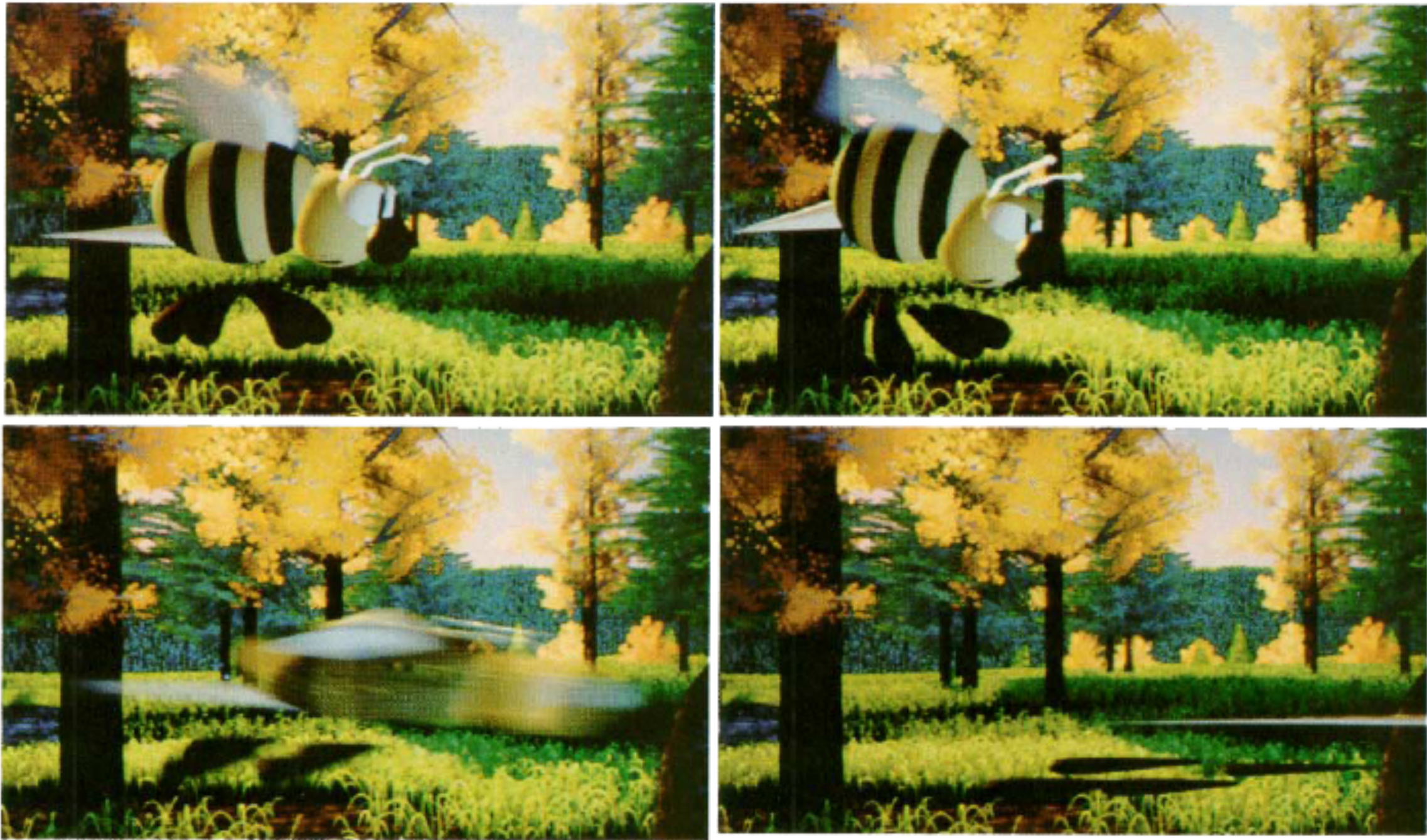


FIGURE 4c. Stretching the object so that its positions overlap again will relieve the strobic effect.

Anticipation



Slow in, Slow out

Objects with mass must accelerate and decelerate

Interesting frames are typically at ends, tweaks perception to emphasize these poses

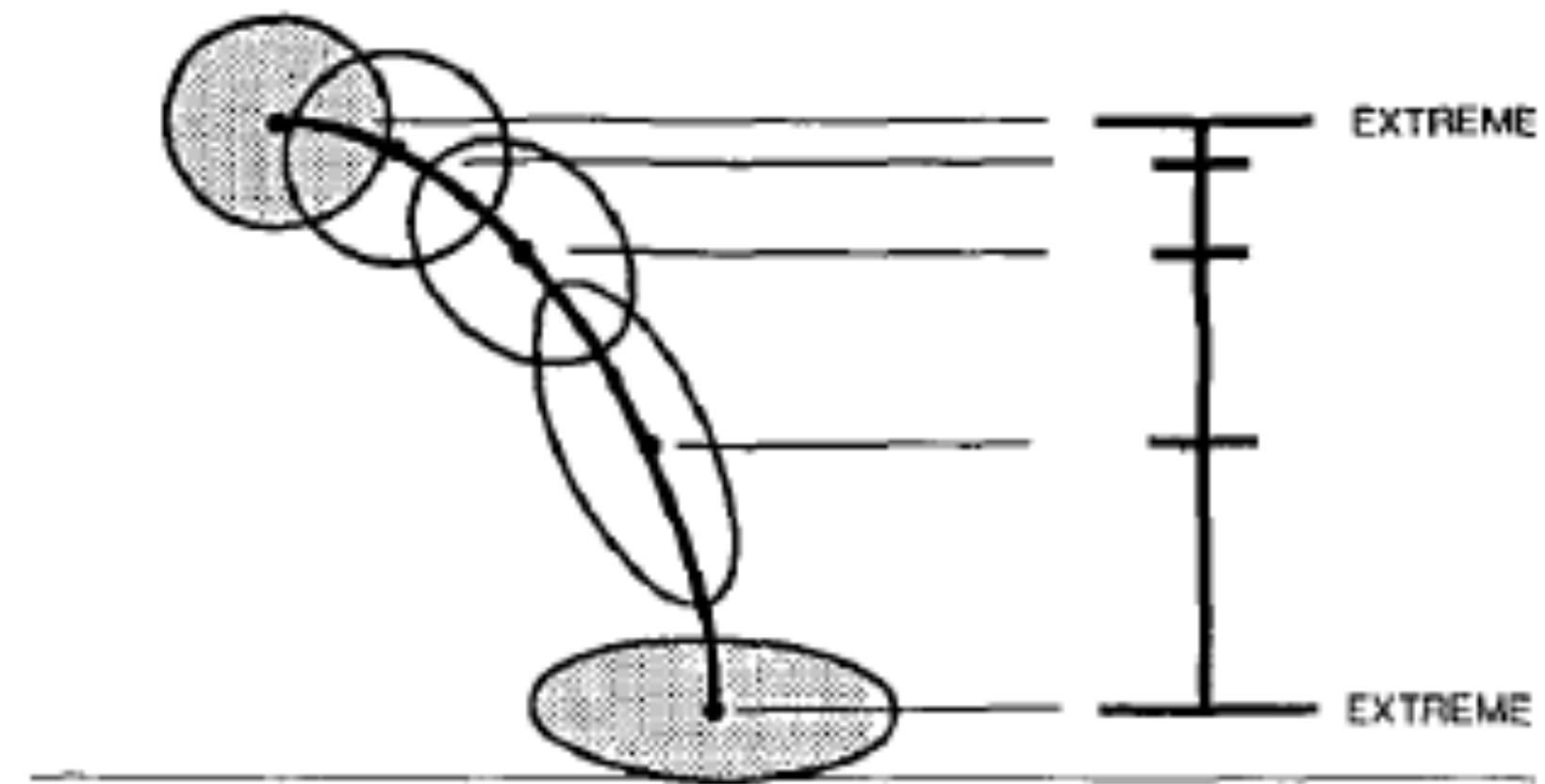


FIGURE 9. Timing chart for ball bounce.

Combine principles into an animation toolkit



What can UI toolkits also learn from animation?

Solidity

Desktop objects should appear to be solid objects

Exaggeration

Exaggerate physical actions to enhance perception

Reinforcement

Use effects to drive home feeling of reality

Using principles of animation makes it easier for the user to track objects and understand what is changing on the screen.

Published in UIST'93: User Interface Software and Technology, Atlanta, GA, November 3-5, 1993, pp. 45-55

Animation: From Cartoons to the User Interface

Bay-Wei Chang

Computer Systems Laboratory
Stanford University
Stanford, CA 94305
bay@self.stanford.edu

David Ungar

Sun Microsystems Laboratories, Inc.
2550 Garcia Avenue
Mountain View, CA 94043
david.ungar@sun.com

You must learn to respect that golden atom, that single frame of action, that 1/24th of a second, because the difference between lightning and the lightning bug may hinge on that single frame.
— Chuck Jones [10]

ABSTRACT

User interfaces are often based on static presentations, a model ill suited for conveying change. Consequently, events on the screen frequently startle and confuse users. Cartoon animation, in contrast, is exceedingly successful at engaging its audience; even the most bizarre events are easily comprehended. The Self user interface has served as a testbed for the application of cartoon animation techniques as a means of making the interface easier to understand and more pleasant to use. Attention to timing and transient detail allows Self objects to move solidly. Use of cartoon-style motion blur allows Self objects to move quickly and still maintain their comprehensibility. Self objects arrive and depart smoothly, without sudden materializations and disappearances, and they rise to the front of overlapping objects smoothly through the use of dissolve. Anticipating motion with a small contrary motion and pacing the middle of transitions faster than the endpoints results in smoother and clearer movements. Despite the differences between user interfaces and cartoons, cartoons are fun and

these tableaux, but less thought is given to the transitions between them. Visual changes in the user interface are sudden and often unexpected, surprising users and forcing them to mentally step away from their task in order to grapple with understanding what is happening in the interface itself.

When the user cannot visually track the changes occurring in the interface, the causal connection between the old state of the screen and the new state of the screen is not immediately clear. How are the objects now on the screen related to the ones which were there a moment ago? Are they the same objects, or have they been replaced by different objects? What changes are directly related to the user's actions, and which are incidental? To be able to efficiently and reliably interpret what has happened when the screen changes state, the user must be prepared with an expectation of what the screen will look like after the action. In the case of most interactions in unanimated interfaces, this expectation can only come by experience; little in the interface or the action gives the user a clue about what will happen, what is happening, or what just happened.

For example, the Microsoft Windows interface [15] expands an icon to a window by eliminating the icon and drawing the window in the next instant. In this case the first static presentation is the screen with the icon; the next is the

What can UI toolkits also learn from animation?

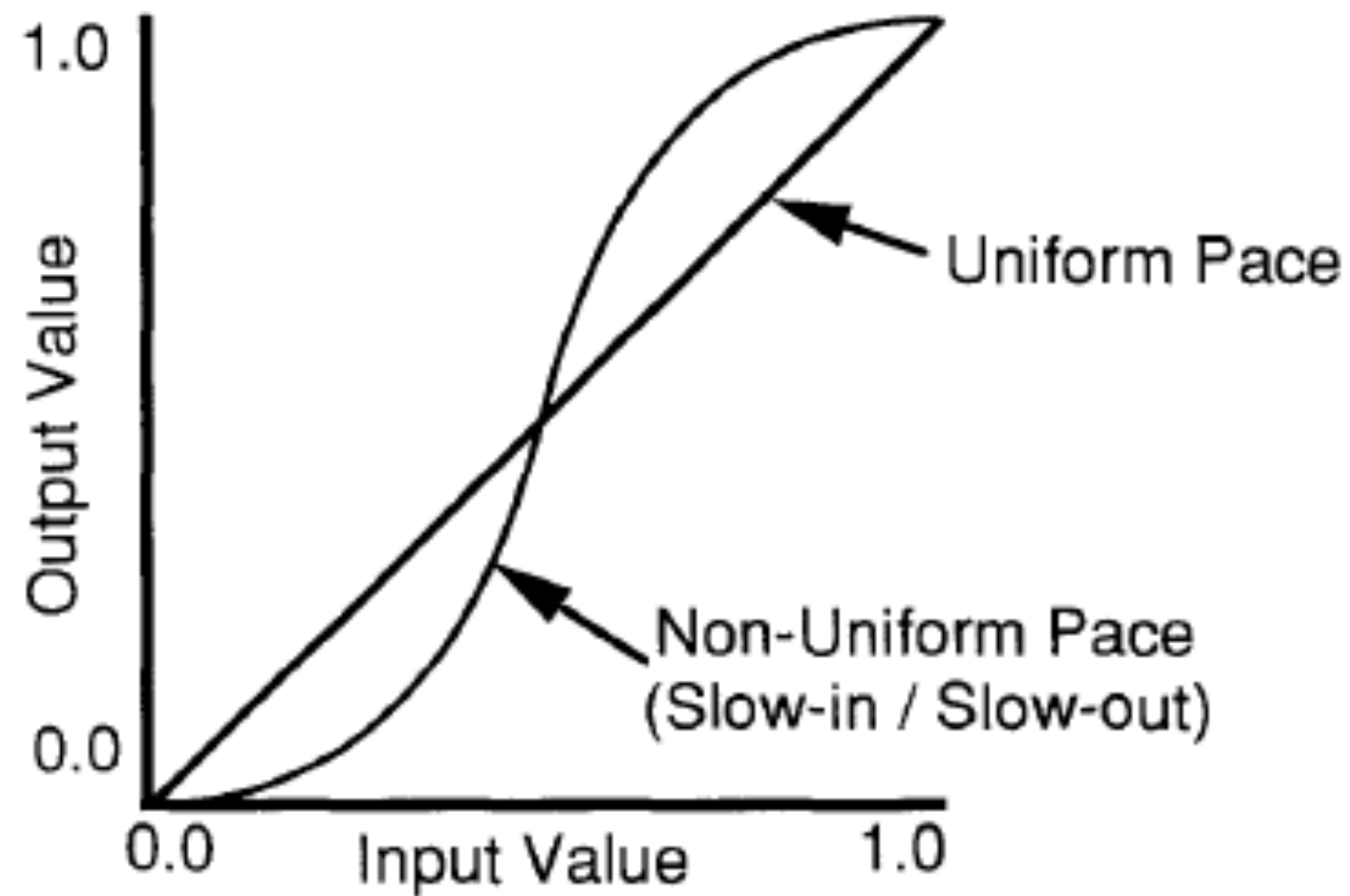


Figure 4. Two Example Pacing Functions

Animation Support in a User Interface Toolkit: Flexible, Robust, and Reusable Abstractions

Scott E. Hudson
John T. Stasko

Graphics Visualization and Usability Center
College of Computing
Georgia Institute of Technology
Atlanta, GA 30332-0280

E-mail: hudson@cc.gatech.edu, stasko@cc.gatech.edu

ABSTRACT

Animation can be a very effective mechanism to convey information in visualization and user interface settings. However, integrating animated presentations into user interfaces has typically been a difficult task since, to date, there has been little or no explicit support for animation in window systems or user interface toolkits. This paper describes how the Artkit user interface toolkit has been extended with new animation support abstractions designed to overcome this problem. These abstractions provide a powerful but convenient base for building a range of animations, supporting techniques such as simple motion-blur, "squash and stretch", use of arcing trajectories, anticipation and follow through, and "slow-in / slow-out" transitions. Because these abstractions are provided by the toolkit they are reusable and may be freely mixed with more conventional user interface techniques. In addition, the Artkit implementation of these abstractions is robust in the face of systems (such as the X Window System and Unix) which can be ill-behaved with respect to timing considerations.

Keywords: object-oriented user interface toolkits, window systems, animation techniques, dynamic interfaces, motion blur, real-time scheduling.

often be much more easily comprehended in a moving scene than in a single static image or even a sequence of static images. For example, the "cone tree" display described in [Robe93] provides a clear illustration that the use of continuous motion can allow much more information to be presented and understood more easily.

However, even though the potential benefits of animation in user interfaces have been recognized for some time ([Baec90] for example, surveys a number of uses for animation in the interface and cites their benefits and [Stask93] reviews principles for using animation in interfaces and describes a number of systems that make extensive use of animation in an interface), explicit support for animation is rarely, if ever, found in user interface support environments. The work described in this paper is designed to overcome this problem by showing how flexible, robust, and reusable support for animation can be incorporated into a full scale object-oriented user interface toolkit. Specifically, this paper describes how the extension mechanisms of Artkit — the Advanced Reusable Toolkit (supporting interfaces in C++) [Henr90] — have been employed to smoothly integrate animation support with other user interface capabilities.

Now in almost every major UI toolkit out there!
(e.g., Microsoft's WPF, JavaFX, jQuery)

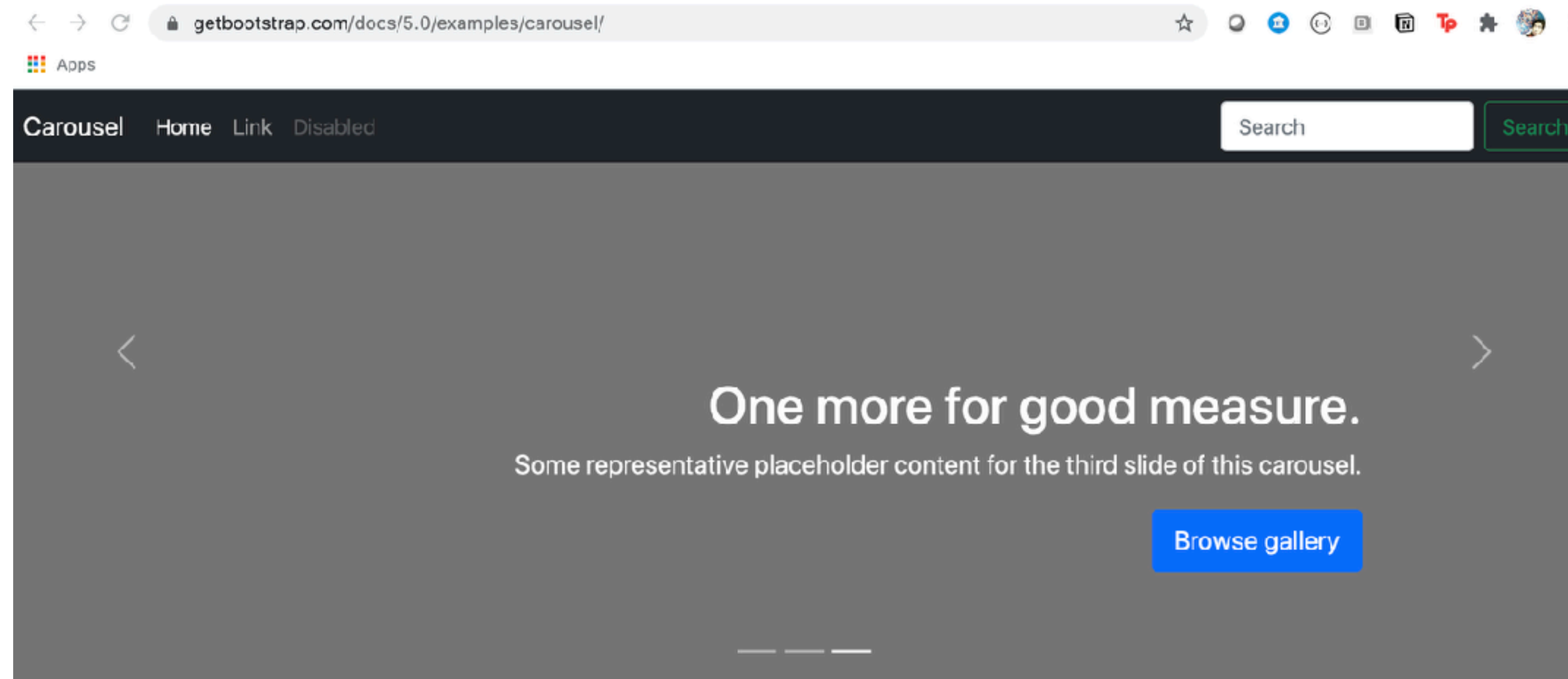
UI Patterns

What is a UI or interaction design pattern?

- “... a general repeatable solution to a commonly-occurring usability problem in interface design...”
- Different from design principles in that they provide abstractions of tangible **solutions**, as opposed to guidelines to follow. Patterns often *incorporate* principles.
- UI toolkits oftentimes incorporate patterns.

Example

- UI **Toolkit**: Bootstrap
- ...includes the **design pattern**: picture carousel landing page
- ...can incorporate important **design principles** such as:
 - [Heuristic #7] Flexibility and efficiency of use (can wait for items to swipe OR click to speed ahead)



Activity

- Here's a really old website!
- But I bet you can still answer questions about this site, how it works, and what it's for.
- Why? Many UI patterns used on this page are still used today.
- Try to spot some patterns that you recognize as still in use today and note them here: www.yellkey.com/believe

half.com by eBay

NEW: Counting Crows: *Hard Candy* \$11.88 Save 37%! my account cart help eBay home sign in

Home Books Music DVDs/Movies Video Games Computers & Software Electronics Everything Else...

Gift Certificates Wish List Pre-Orders Sell Your Stuff New Users

Search: All Categories go

The Smartest Place to Buy and Sell Books, Music, Computers, Electronics, DVDs & more...

Welcome
[Learn about Buying](#)
[Learn about Selling](#)
[Register Now!](#)
[Announcement Board](#)
 Updated Jun 13, 2002

DESKTOP LIQUIDATION CENTER as low as \$249!

Categories
Books
[Textbooks](#), [Fiction](#), [Biography](#), [Cooking](#), [Business](#), & more...
Music
[Rock](#), [Hip Hop/Rap](#), [Country](#), [Pop](#), [eBay items](#), & more...
Movies/DVDs
[Action](#), [Comedy](#), [Children's](#), [Romance](#), [Animation](#), & more...
Games
[PS2](#), [Xbox](#), [GameCube](#), [Dreamcast](#), [N64](#), & more...

New CD Releases!
 only \$11.88
 More Hot New Releases!

Advance Orders
[The Simpsons: Complete 2nd Season \(DVD\)](#) \$34.97 Save 30%!
[The Sopranos: Complete 3rd Season \(DVD\)](#) \$67.99 Save 32%!
[Tom Clancy: Red Rabbit \(Hardcover\)](#) \$19.40 Save 33%!

In Computers
Gateway Desktop Under \$400!
~~\$399.00~~
 Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!
Save Over \$100 on Dell Latitude CPx!
~~\$639.00~~
 Get the best quality at the best price with the Dell Latitude CPx featuring an Intel Pentium III@ 500 MHz processor, 256 MB RAM and 12 GB hard drive.
Gateway Desktop Under \$500
~~\$499.00~~
 Includes a 1GHz Intel Pentium III processor, 256MB RAM, 20GB hard drive, CD-RW drive, 250MB ZIP Drive, and more!
[More great deals...](#)

Music
Red Hot Price for the Chili Peppers' New CD: \$11.88!
 Evolving after the popularity of *Californication*, the Chili Peppers release a new album featuring the hit song "By the Way".

In-Stock Now!	Our Price	List Price
Weezer , Weezer	\$6.99	\$18.97
Gutterflower , Goo Goo Dolls	\$9.00	\$18.98
The Slim Shady LP , Eminem	\$2.98	\$18.97
Echoes , Pink Floyd	\$11.54	\$24.97
18 , Moby	\$10.99	\$18.98

Movies
Just Released: The Royal Tenenbaums for \$18.45
 Wes Anderson (*Rushmore*) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

In-Stock Now!	Our Price	List Price
Monster's Ball (DVD)	\$11.25	\$24.99

Logo

Site logo in top-left corner, probably clickable to get to homepage

half.com™
by **ebay**

NEW: [Counting Crows: Hard Candy](#) \$11.88 Save 37%! my account cart help [ebay home](#) [sign in](#)

Home Books Music DVDs/Movies Video Games Computers & Software Electronics Everything Else...

Gift Certificates Wish List Pre-Orders Sell Your Stuff New Users

Search: All Categories

The Smartest Place to Buy and Sell Books, Music, Computers, Electronics, DVDs & more...

New CD Releases!

only **\$11.88**

[More Hot New Releases!](#)

Welcome

[Learn about Buying](#)
[Learn about Selling](#)
[Register Now!](#)
[Announcement Board](#)
Updated Jun 13, 2002

DESKTOP LIQUIDATION CENTER

as low as **\$249!**

Categories

Books
[Textbooks](#), [Fiction](#), [Biography](#), [Cooking](#), [Business](#), & more...

Music
[Rock](#), [Hip Hop/Rap](#), [Country](#), [Pop](#), [eBay items](#), & more...

Movies/DVDs
[Action](#), [Comedy](#), [Children's](#), [Romance](#), [Animation](#), & more...

Games
[PS2](#), [Xbox](#), [GameCube](#), [Dreamcast](#), [N64](#), & more...

Music

Red Hot Price for the Chili Peppers' New CD: \$11.88!
Evolving after the popularity of *Californication*, the Chili Peppers release a new album featuring the hit song "By the Way".

	Our Price	List Price
In-Stock Now!		
Weezer , Weezer	\$6.99	\$18.97
Gutterflower , Goo Goo Dolls	\$9.00	\$18.98
The Slim Shady LP , Eminem	\$2.98	\$18.97
Echoes , Pink Floyd	\$11.54	\$24.97
18 , Moby	\$10.99	\$18.98

Movies

Just Released: *The Royal Tenenbaums* for \$18.45
Wes Anderson (*Rushmore*) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

	Our Price	List Price
In-Stock Now!		
Monster's Ball (DVD)	\$11.25	\$24.99

Advance Orders

The Simpsons: Complete 2nd Season (DVD) **\$34.97**
Save 30%!

[The Sopranos: Complete 3rd Season \(DVD\)](#) **\$67.99** Save 32%!

[Tom Clancy: Red Rabbit \(Hardcover\)](#) **\$19.40** Save 33%!

In Computers

Gateway Desktop Under \$400!
~~\$399.00~~

Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!

Save Over \$100 on Dell Latitude CPx!
~~\$639.00~~

Get the best quality at the best price with the Dell Latitude CPx featuring an Intel Pentium III@ 500 MHz processor, 256 MB RAM and 12 GB hard drive.

Gateway Desktop Under \$500
~~\$499.00~~

Includes a 1GHz Intel Pentium III processor, 256MB RAM, 20GB hard drive, CD-RW drive, 250MB ZIP Drive, and more!

[More great deals...](#)

Navbars

navigation bar in the top of the page

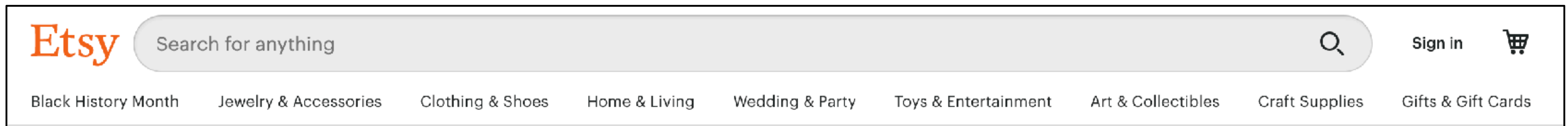
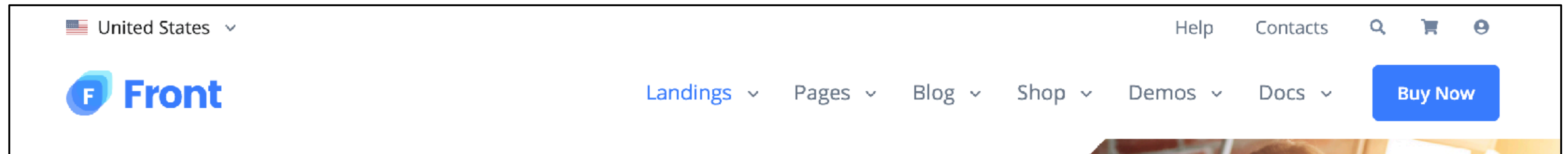
account settings, cart, login in top right



search at the top of the page

Below: Bootstrap templates and real websites today

Some visual cues are different and a different look and feel is in vogue but much of the design pattern of the navbar is the same.



sidebar
faceted
browsing

The screenshot shows the half.com by eBay website. A sidebar on the left is highlighted with a red border and contains the following sections:

- Welcome**
 - [Learn about Buying](#)
 - [Learn about Selling](#)
 - [Register Now!](#)
 - [Announcement Board](#)
Updated Jun 13, 2002
- DESKTOP LIQUIDATION CENTER** as low as \$249!
- Categories**
 - Books**
[Textbooks](#), [Fiction](#), [Biography](#), [Cooking](#), [Business](#), & more...
 - Music**
[Rock](#), [Hip Hop/Rap](#), [Country](#), [Pop](#), [eBay items](#), & more...
 - Movies/DVDs**
[Action](#), [Comedy](#), [Children's](#), [Romance](#), [Animation](#), & more...
 - Games**
[PS2](#), [Xbox](#), [GameCube](#), [Dreamcast](#), [N64](#), & more...

Sidebars

Bootstrap template

The screenshot shows a Bootstrap template for a shopping site. The sidebar on the left contains a navigation menu:

- Home ^
- Default
- Classic
- Fashion
- Boxed
- Simple
- Asymmetric
- Sidenav
- Landing
- Catalog v
- Shop v
- Pages v
- Blog v

Amazon website

The screenshot shows the Amazon website with several sidebar recommendation sections:

- Popular in Books**
 - Award Winners
 - Bargain Books
 - Best Books of the Month
 - Best Books of 2020
 - BHM: Books To Read Right Now
 - Celebrity Picks
 - Books in Spanish
 - Children's Books
 - Deals in Books
 - Prime Book Box
 - Top 20 Lists in Books
- More in Books**
 - 100 Books to Read in a Lifetime
 - Amazon Book Review
 - Amazon Books on Facebook
 - Amazon Books on Twitter
 - Amazon Books Stores
 - Amazon First Reads
 - Book Club Picks
 - From Page to Screen
 - Start a New Series
- Textbooks**
 - Textbooks Store
 - Textbook Rentals
 - Kindle eTextbooks
- Kindle & Audible**
 - Audible Audiobooks
 - Kindle eBooks
 - Kindle Deals
 - Kindle Unlimited
 - Prime Reading
- New Releases**
 - Last 30 days
 - Last 90 days
 - Coming Soon

The "L" shape navigation

half.com by eBay

NEW: Counting Crows: *Hard Candy* \$11.88 Save 37%! my account cart

Home Books Music DVDs/Movies Video Games Computers & Software Electronics Everything Else...

Gift Certificates Wish List Pre-Orders Sell Your Stuff New Users

Search: All Categories GO

The Smartest Place to Buy and Sell Books, Music, Computers, Electronics, DVDs & more.

welcome

Learn about Buying
Learn about Selling
Register Now!
Announcement Board
Updated Jun 13, 2002

DESKTOP LIQUIDATION CENTER as low as \$249!

Categories

Books
Textbooks, Fiction, Biography, Cooking, Business, & more...

Music
Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...

Movies/DVDs
Action, Comedy, Children's, Romance, Animation, & more...

Games
PS2, Xbox, GameCube, Dreamcast, N64, & more...

New CD Releases! only \$11.88

Music

Red Hot Price for the Chili Peppers' New CD: \$11.88!
Evolving after the popularity of *Californication*, the Chili Peppers release a new album featuring the hit song "By the Way".

In-Stock Now!	Our Price	List Price
Weezer , Weezer	\$6.99	\$18.97
Gutterflower , Goo Goo Dolls	\$9.00	\$18.98
The Slim Shady LP , Eminem	\$2.98	\$18.97
Echoes , Pink Floyd	\$11.54	\$24.97
18 , Moby	\$10.99	\$18.98

Movies

Just Released: The Royal Tenenbaums for \$18.45
Wes Anderson (*Rushmore*) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

In-Stock Now!	Our Price	List Price
Monster's Ball (DVD)	\$11.25	\$24.99

Group for User Interface Research Home Projects People Publications Links

DENIM and SILK

Download
Documentation
Support
Research
Publications
More Projects

DENIM and SILK

United States Home Products & services Support & downloads My account

Select a country

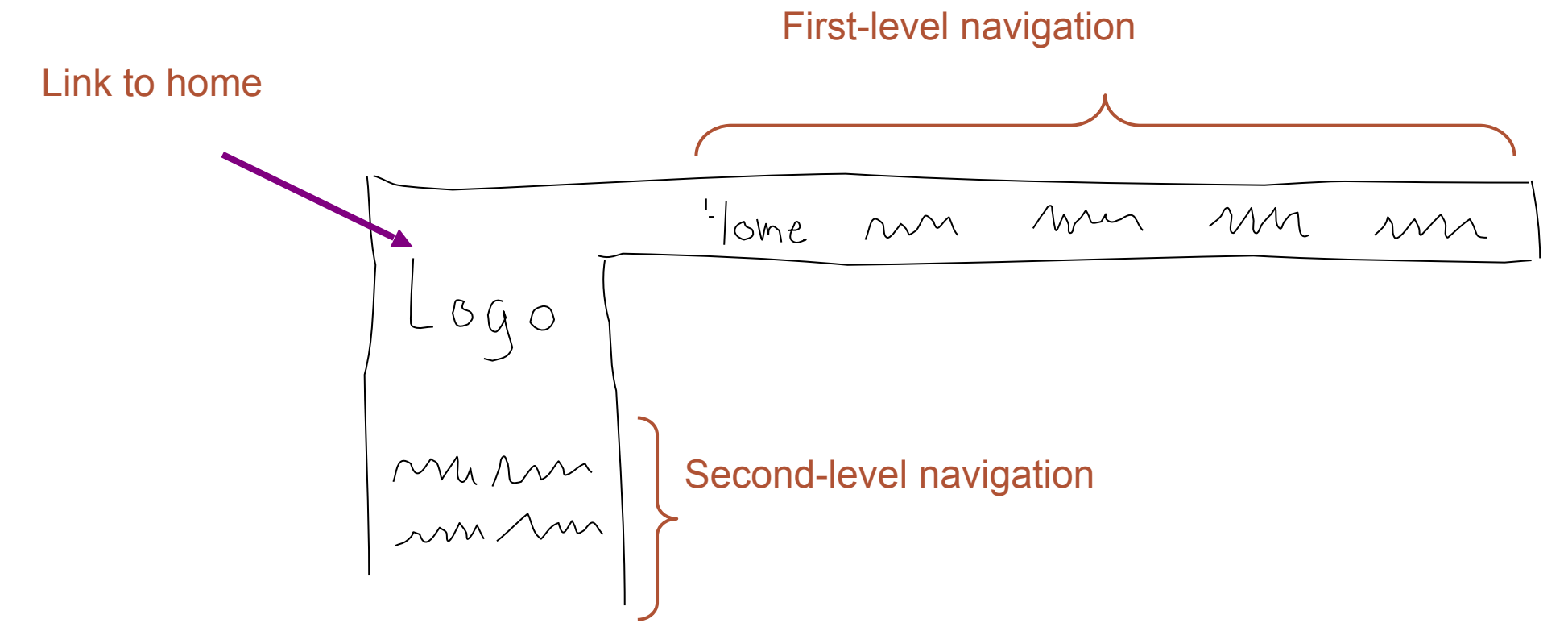
Inc...str...es

- Home / Home office
- Small business
- Medium business
- Government
- Education

Buy today, ship today

If you need a fast, IBM can ship select PC models to you today when you use the IBM... Member since 1993 only

IBM Global Financing



Tables

Tabular view of data

Alternate colors of rows, gray and white

Column headers at the top, bolded

Left column is left aligned

Numerical columns are center-aligned (maybe should be right-aligned)

Similar Bootstrap component

The screenshot shows a website layout with several sections:

- Announcement Board:** Updated Jun 13, 2002.
- DESKTOP LIQUIDATION CENTER:** as low as \$249!
- Categories:**
 - Books:** Textbooks, Fiction, Biography, Cooking, Business, & more...
 - Music:** Rock, Hip Hop/Rap, Country, Pop, eBay items, & more...
 - Movies/DVDs:** Action, Comedy, Children's, Romance, Animation, & more...
- Music Section:**
 - Red Hot Price for the Chili Peppers' New CD: \$11.88!** Evolving after the popularity of *Californication*, the Chili Peppers release a new album featuring the hit song "By the Way".
 - In-Stock Now!**

	Our Price	List Price
Weezer , Weezer	\$6.99	\$18.97
Gutterflower , Goo Goo Dolls	\$9.00	\$18.98
The Slim Shady LP , Eminem	\$2.98	\$18.97
Echoes , Pink Floyd	\$11.54	\$24.97
18 , Moby	\$10.99	\$18.98
- Movies Section:**
 - Just Released: *The Royal Tenenbaums* for \$18.45** Wes Anderson (*Rushmore*) directs a motley crew of talented actors in
- The Sopranos: Complete 3rd Season (DVD) \$67.99** Save 32%!
- Tom Clancy: Red Rabbit (Hardcover) \$19.40** Save 33%!
- In Computers:**
 - Gateway Desktop Under \$400! \$399.00** Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!
 - Save Over \$100 on Dell Latitude CPx! \$639.00** Get the best quality at the best price with the Dell Latitude CPx featuring an Intel Pentium III@ 500 MHz processor, 256 MB RAM and 12 GB hard drive.
 - Gateway Desktop Under \$500 \$499.00** Includes a 1GHz Intel Pentium

Striped rows

Use `.table-striped` to add zebra-striping to any table row within the `<tbody>`.

#	First	Last	Handle
1	Mark	Otto	@mdo
2	Jacob	Thornton	@fat
3	Larry the Bird		@twitter

Grid Layout

Grid layout with header, 3 columns, and a main center column

These layouts have been with us since paper newspapers and pamphlets!

Grid layouts are such a common pattern that they are now buildable using vanilla CSS and recognized in all major browsers as of 2017



half.com[™] by ebay

NEW: Counting Crows: *Hard Candy* \$11.88 Save 37%! my account cart help ebay home sign in

Home Books Music DVDs/Movies Video Games Computers & Software Electronics Everything Else...

Gift Certificates Wish List Pre-Orders Sell Your Stuff New Users

Search: All Categories go

The Smartest Place to Buy and Sell Books, Music, Computers, Electronics, DVDs & more...

Welcome

[Learn about Buying](#)
[Learn about Selling](#)
[Register Now!](#)
[Announcement Board](#)
Updated Jun 13, 2002

DESKTOP LIQUIDATION CENTER as low as \$249!

Categories

Books
[Textbooks](#), [Fiction](#), [Biography](#), [Cooking](#), [Business](#), & more...

Music
[Rock](#), [Hip Hop/Rap](#), [Country](#), [Pop](#), eBay

New CD Releases! only \$11.88

[More Hot New Releases!](#)

Music

Red Hot Price for the Chili Peppers' New CD: \$11.88!
Evolving after the popularity of *Californication*, the Chili Peppers release a new album featuring the hit song "By the Way".

In-Stock Now!	Our Price	List Price
Weezer , Weezer	\$6.99	\$18.97
Gutterflower , Goo Goo Dolls	\$9.00	\$18.98
The Slim Shady LP , Eminem	\$2.98	\$18.97
Echoes , Pink Floyd	\$11.54	\$24.97
18 , Moby	\$10.99	\$18.98

Movies

Just Released: *The Royal Tenenbaums* for \$18.45
Wes Anderson (*Rushmore*) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

In-Stock Now!	Our Price	List Price
Monster's Ball (DVD)	\$11.25	\$24.99

Advance Orders

[The Simpsons: Complete 2nd Season \(DVD\)](#) \$34.97 Save 30%!

[The Sopranos: Complete 3rd Season \(DVD\)](#) \$67.99 Save 32%!

[Tom Clancy: Red Rabbit \(Hardcover\)](#) \$19.40 Save 33%!

In Computers

Gateway Desktop Under \$400!
~~\$399.00~~

Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!

Save Over \$100 on Dell Latitude CPx!
~~\$639.00~~

Get the best quality at the best price with the Dell Latitude CPx featuring an Intel Pentium III@ 500 MHz processor, 256 MB RAM and 12 GB hard drive.

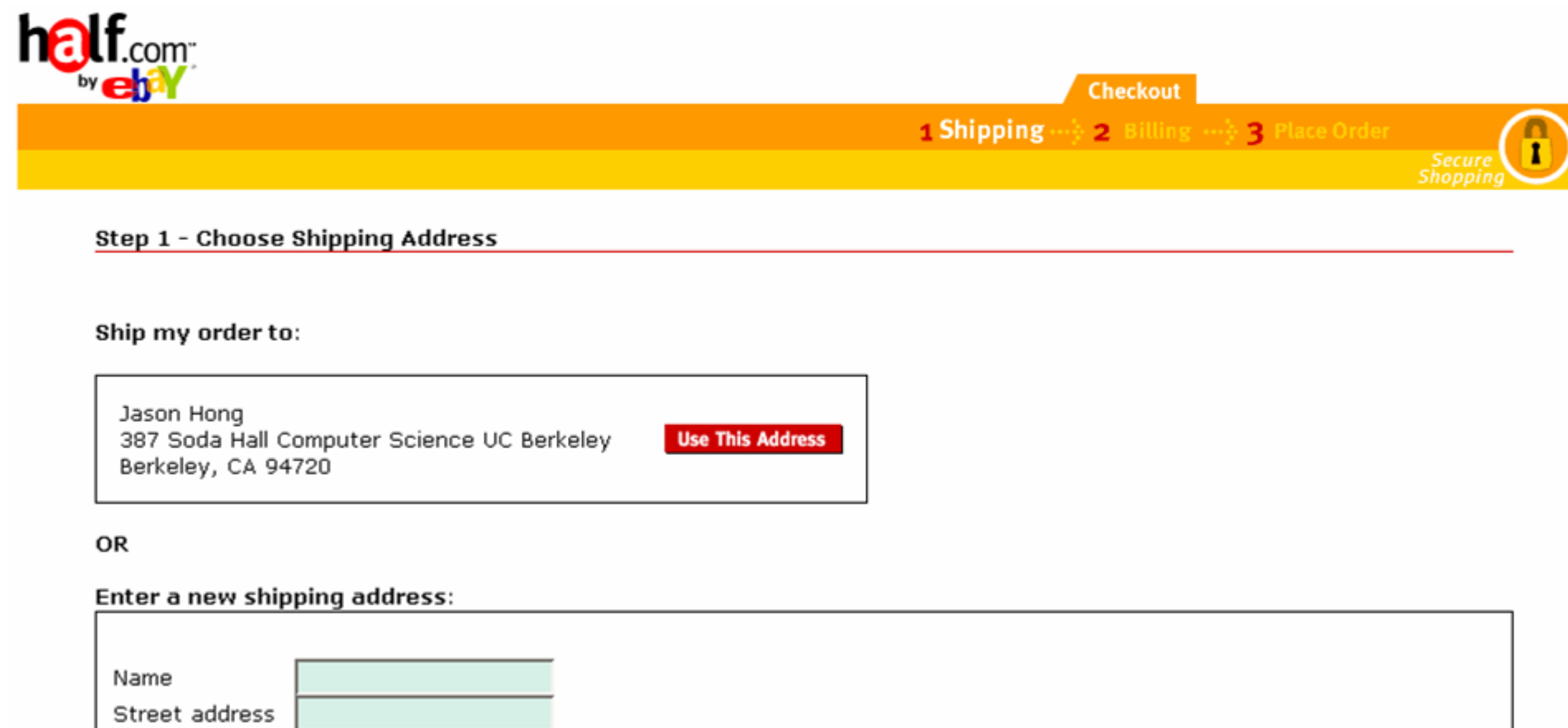
Gateway Desktop Under \$500
~~\$499.00~~

Includes a 1GHz Intel Pentium III processor, 256MB RAM, 20GB hard drive, CD-RW drive, 250MB ZIP Drive, and more!

[More great deals...](#)

Patterns can also describe common user flows

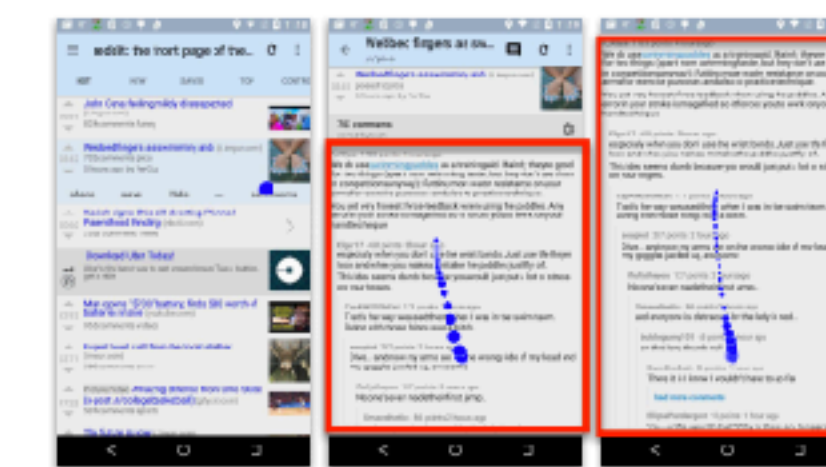
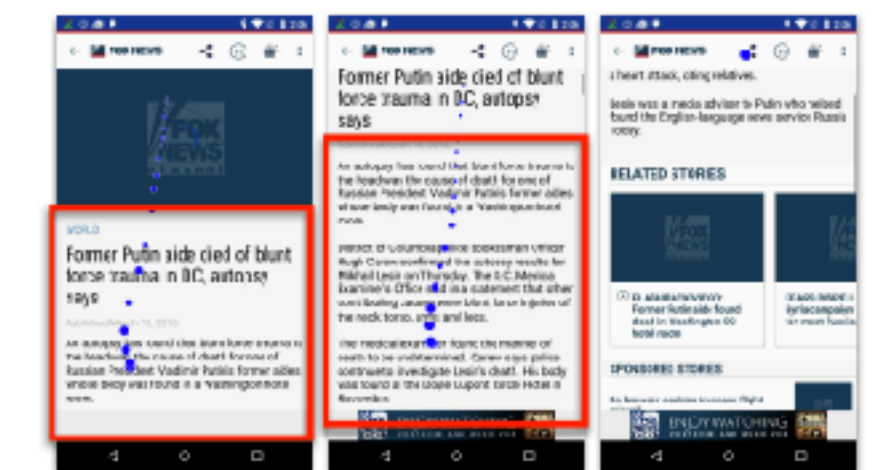
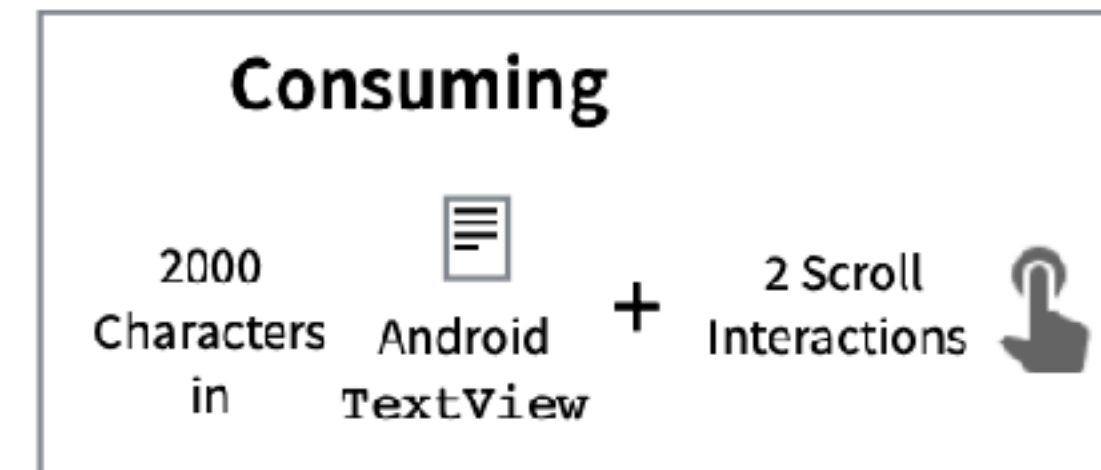
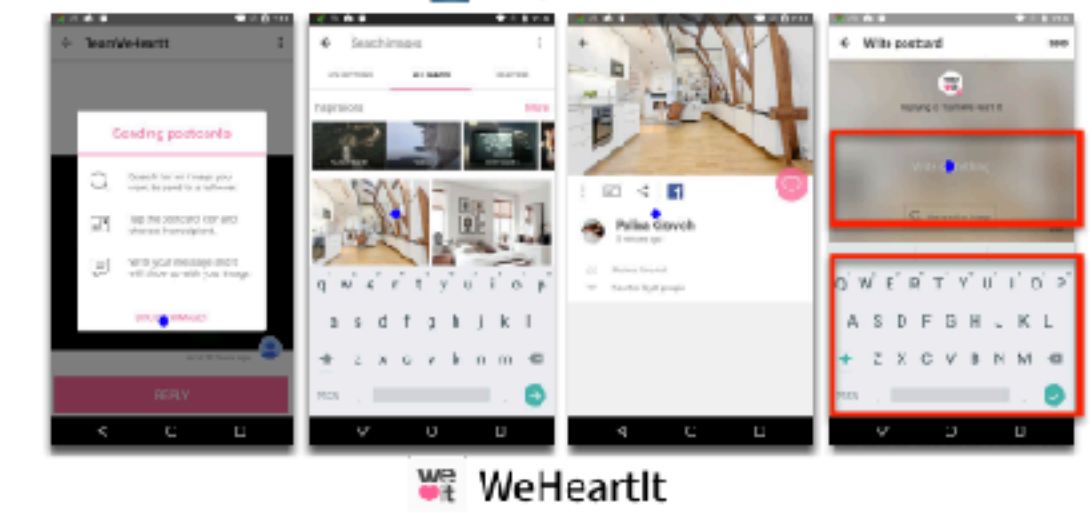
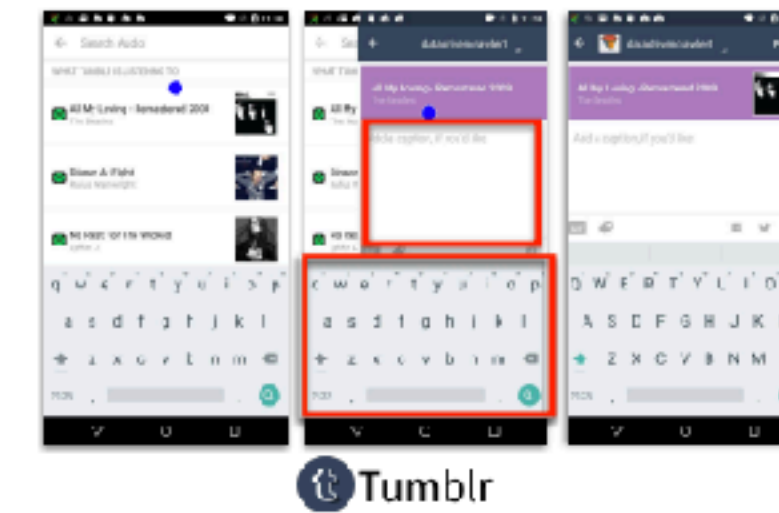
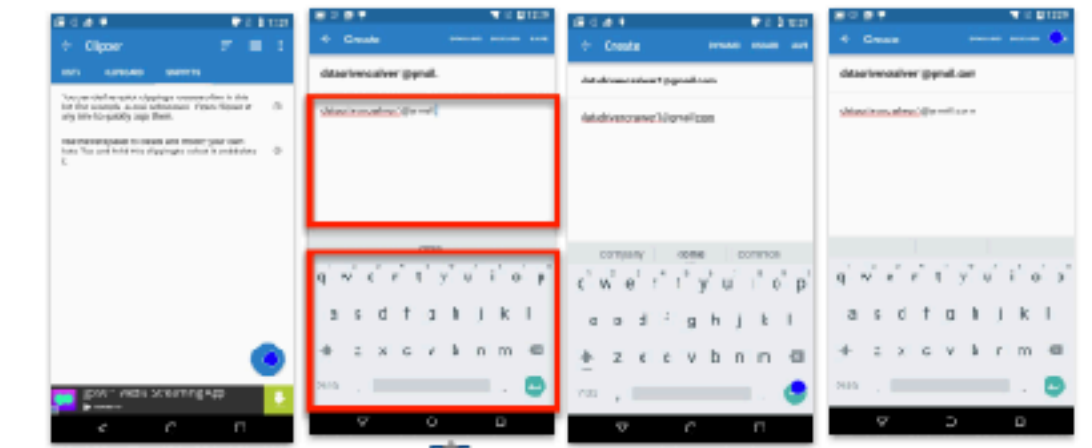
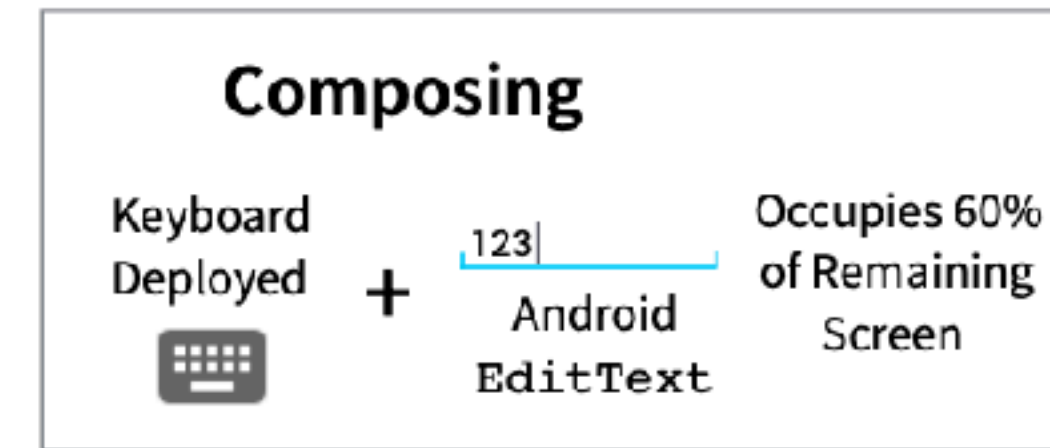
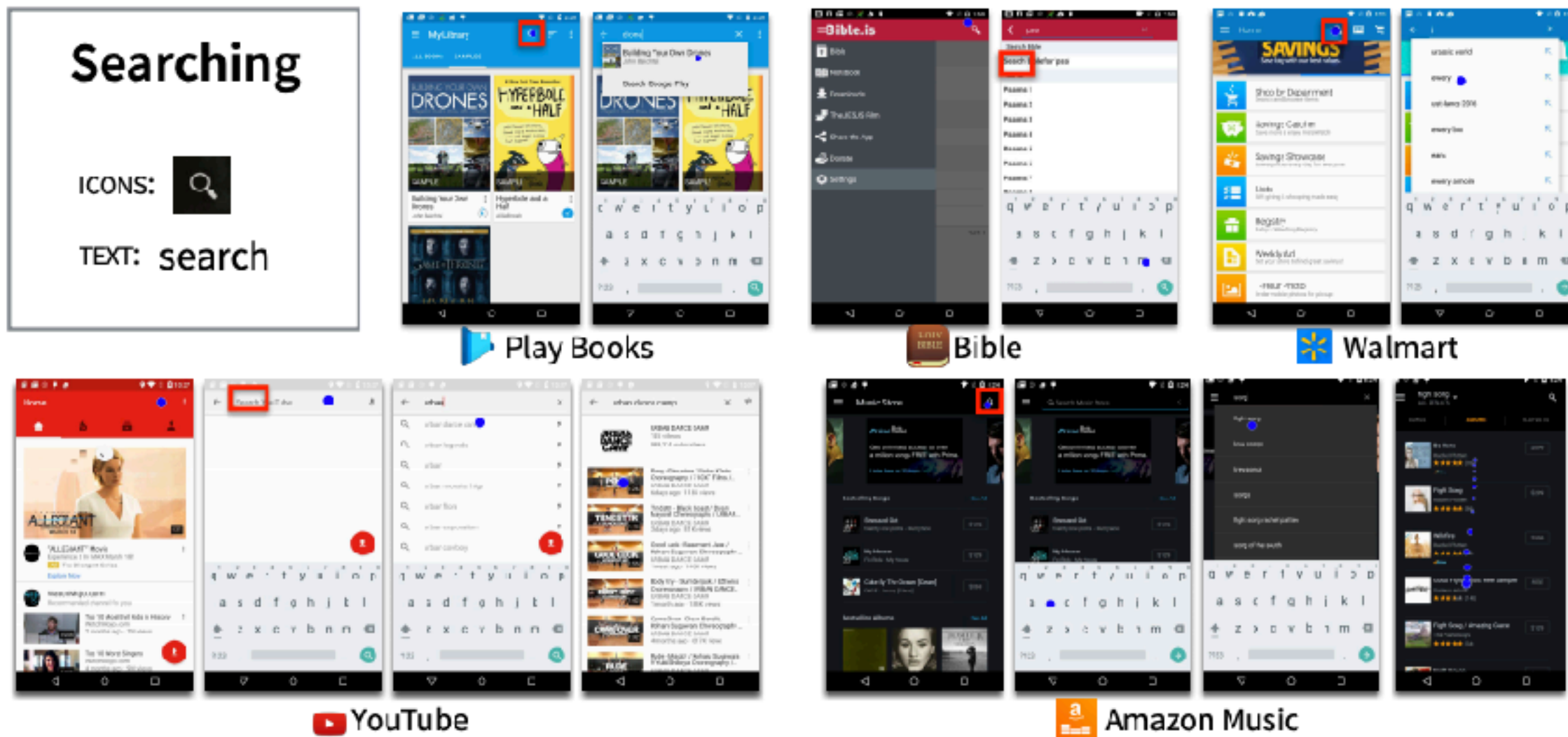
- Shopping checkout: shipping -> billing -> summary -> place order
- **User flows** are an important component of user experience (UX) design and consists of a sequence of UI states that represent semantically meaningful tasks such as searching or composing.



The screenshot shows the checkout process on the half.com by eBay website. At the top, the logo "half.com by eBay" is visible. A progress bar indicates the current step: "1 Shipping" (highlighted), "2 Billing", and "3 Place Order". A "Checkout" button is also present. A "Secure Shopping" icon with a padlock is shown on the right. Below the progress bar, the heading "Step 1 - Choose Shipping Address" is displayed. The main content area is titled "Ship my order to:" and contains a box with the following address: "Jason Hong, 387 Soda Hall Computer Science UC Berkeley, Berkeley, CA 94720". A red button labeled "Use This Address" is next to the address. Below this, the word "OR" is shown, followed by the heading "Enter a new shipping address:". This section contains two input fields: "Name" and "Street address".

Patterns can also describe common user flows

- common mobile app UI flows



Deka, Biplab, Zifeng Huang, and Ranjitha Kumar. "ERICA: Interaction mining mobile apps." *Proceedings of the 29th Annual Symposium on User Interface Software and Technology*. 2016.

Design patterns aren't just for UIs

- Very popular in software engineering and OOP after the mid 90s.
- Model-View-Controller (MVC) is a common software design pattern for developing UIs.
- A 1970s book talks about “pattern languages” and relates it to architecture and the planning of cities and towns. This book later influenced software engineering and the first wiki.



Why use design patterns?

- Design is about finding solutions to problems
- Many problems are shared
- Some solutions are better than others
- Designers often reinvent because they don't realize a pattern exists
 - Sometimes it's better to reuse a common solution for a common problem
- Design patterns are a tool for knowledge sharing

Patterns support creativity

- Patterns come from successful examples
 - sites that are so successful that lots of people are familiar with their paradigms
 - interaction techniques/metaphors that work well across many sites (e.g., shopping carts)
- Not too general and not too specific
 - You need to specialize to your needs
- Patterns let you focus on the hard, unique problems of your design situation
- Patterns help design without over-constraining

Pre-patterns

- Patterns require broad adoption and examples
 - Many version of the same basic idea
 - Shown successful in many contexts
 - That is what makes them patterns
- This is challenging in novel domains
- Pre-patterns are based in weaker evidence
 - Can help speed diffusion of techniques and results
 - Can help see relationships among ideas

Pre-patterns, Anti-patterns, and Dark patterns

- When you see advice, consider its depth
 - Result of an individual study
 - Pre-pattern based on some meta-analysis
 - Established pattern
- Be aware of misapplying patterns
 - And be aware of anti-patterns (e.g., “Click here”)
- Don't recreate dark patterns
 - Unethical patterns that trick users

UI Patterns for your Digital Mockup

- Don't need to reinvent the wheel!
- You want to focus on where your UI is interesting and innovative, not in the login flow (probably)
- Find patterns for your digital mockup (3d and 3e):
 - <http://www.welie.com/patterns/index.php>
 - <http://ui-patterns.com/>
 - Many more out there!

User Interface Design Patterns

- Getting input**
Getting the user to input data is a task that should be tailored to the context of use.
- Navigation**
The user needs to locate specific features and content and needs navigation to accomplish this.
- Dealing with data**
Data can be searched, formatted, overviewed, and browsed in a variety of ways.
- Social**
Allow the user to associate, communicate, and interact with other people online.
- Miscellaneous**
Patterns that haven't found their main category yet.
- Onboarding**
The user needs to acquire the necessary knowledge, skills, and behaviors to become effective.

Persuasive Design Patterns

- Cognition**
Patterns of psychological tendencies that cause the human brain to draw incorrect conclusions.
- Game mechanics**
Games engage, involve, and influence us through its playful nature.
- Perception and memory**
Patterns in how we visually perceive, interpret, and remember meanings as we interact with systems.
- Feedback**
As the users interacts with your system feedback motivate them to take the next step.
- Social**
Allow the user to associate, communicate, and interact with other people online.

The screenshot shows the Welie.com website, which is a resource for UI patterns. The page has a dark header with the Welie.com logo and navigation links: Home, Patterns, Visio stuff, and Thoughts. A search bar is located in the top right corner. The main content area is titled "Pattern library" and includes a sub-header "User needs" with a list of patterns categorized by user need. The categories include: Navigating around, Searching, Shopping, Dealing with data, and Giving input. Each category has a list of specific UI patterns. On the right side of the page, there is a "Suggest a pattern" section with a form and a "Latest comments" section with a list of user comments.

Group work time!

- Continue planning tests and revising your paper prototype based on usability testing and heuristic feedback (3c)
- On Thursday, you'll present 3c so far to another group to get feedback before the deadline at 8PM.