



Usable by Everybody

Design principles for accessibility on Mac OS X

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Software Engineer

What Is Universal Design?



Three Main Focus Areas



Yellow Dog Productions · Digital Vision · Getty Images

Focus Areas

Users





Focus Areas

Users



Technologies





Focus Areas

Users



Technologies



Developers



Focus Areas

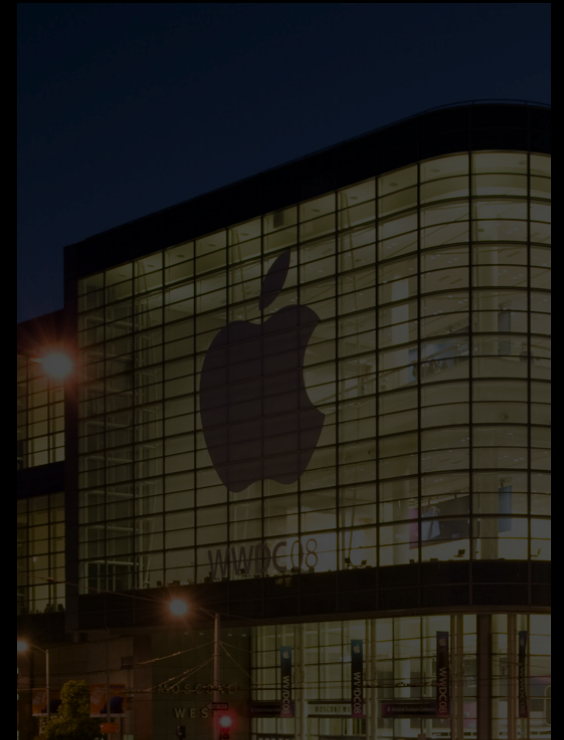
Users



Technologies



Developers



10 Million

Americans are visually impaired

www.afb.org/info_documents.asp?collectionid=15 [Mar 25, 2008]

31 Million

Americans are hearing impaired

S. Kochkin. Marketrak vii: Hearing loss population tops 31 million. The Hearing Review, (2005), July 2005.

12 Million

Americans have a learning disability

C. Smith and L. Strick. Learning Disabilities: A to Z. The Free Press, 1997.

501 Million

Americans have a disability

http://www.census.gov/Press-Release/www/releases/archives/facts_for_features_special_editions/001823.html

User Considerations

Visual



Auditory



Physical



Cognitive



Focus Areas

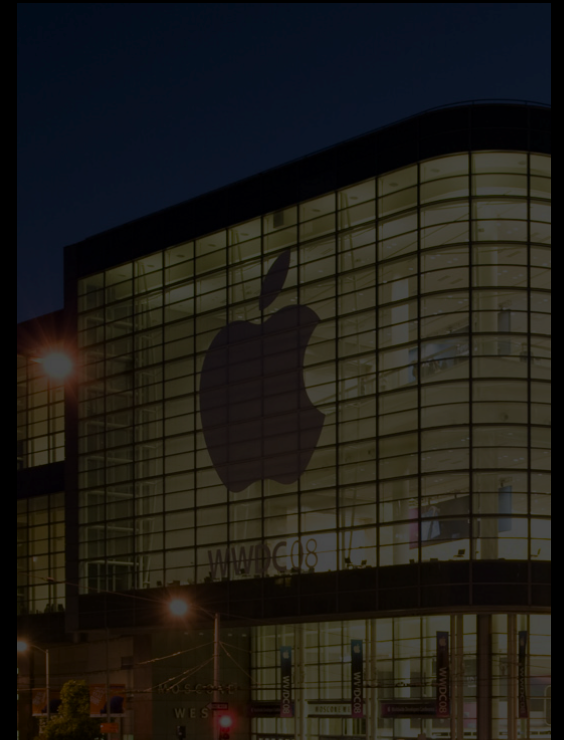
Users



Technologies



Developers



Focus Areas

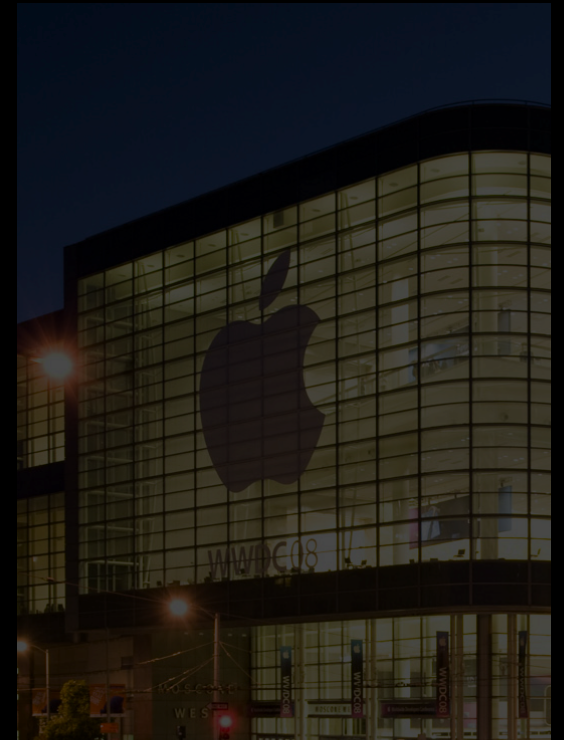
Users



Technologies



Developers



Universal Access

Show All


When using this computer, I would like assistance with:

Seeing Hearing Keyboard Mouse & Trackpad

VoiceOver: Turn VoiceOver on or off: ⌘F5
 On Off Open VoiceOver Utility...

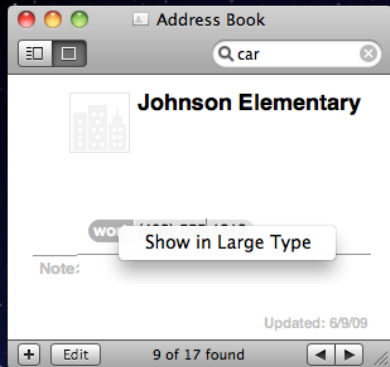
Zoom: Turn zoom on or off: ⌘⌘8
 On Off
Zoom in: ⌘⌘=
Zoom out: ⌘⌘- Options...

Display: Switch to white on black: ⌘⌘8
 Black on white Use grayscale
 White on black

Enhance contrast: 
Normal Maximum

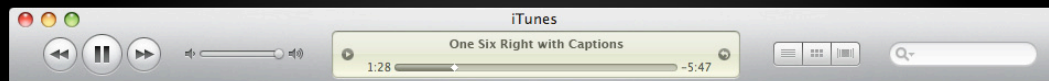
Reduce contrast: ⌘⌘⌘,
Increase contrast: ⌘⌘⌘.

Enable access for assistive devices
 Show Universal Access status in the menu bar

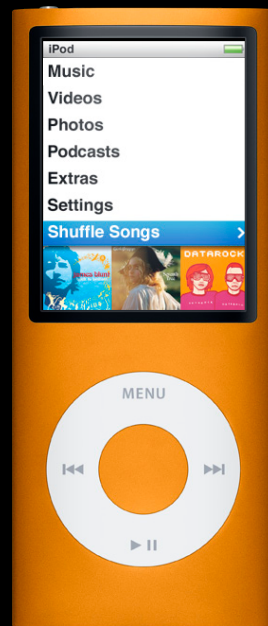


(408) 555-1212





Talking iPods



VoiceOver





Focus Areas

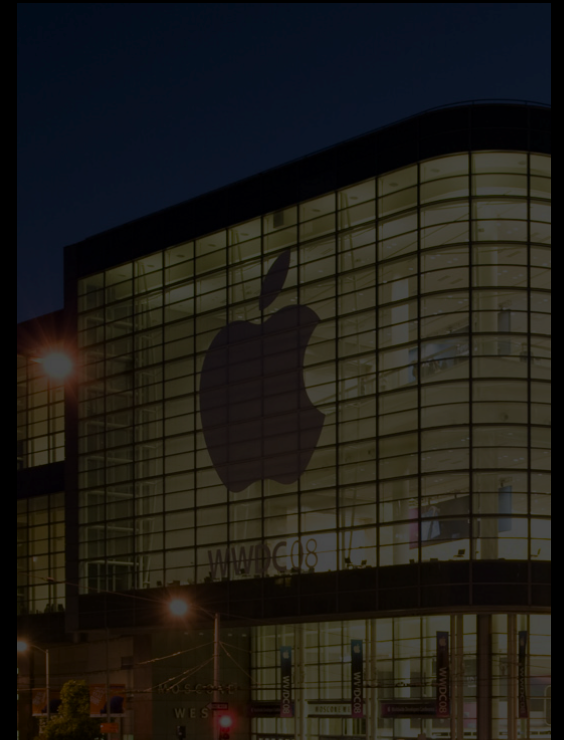
Users



Technologies



Developers



Focus Areas

Users



Technologies



Developers



Universal Design Considerations

Visual



Auditory



Physical



Cognitive



Implementing Universal Design



Perceivable



Operable



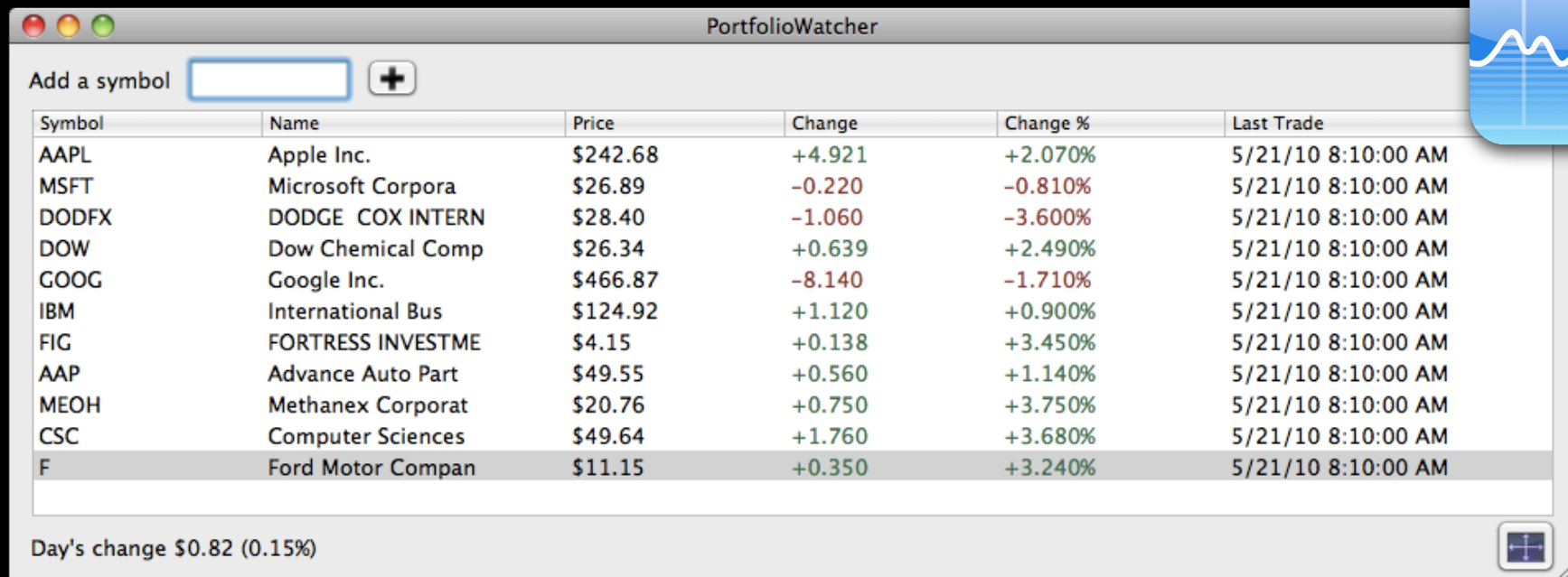
Understandable



Robust



How to Implement Universal Design?



Visual Considerations

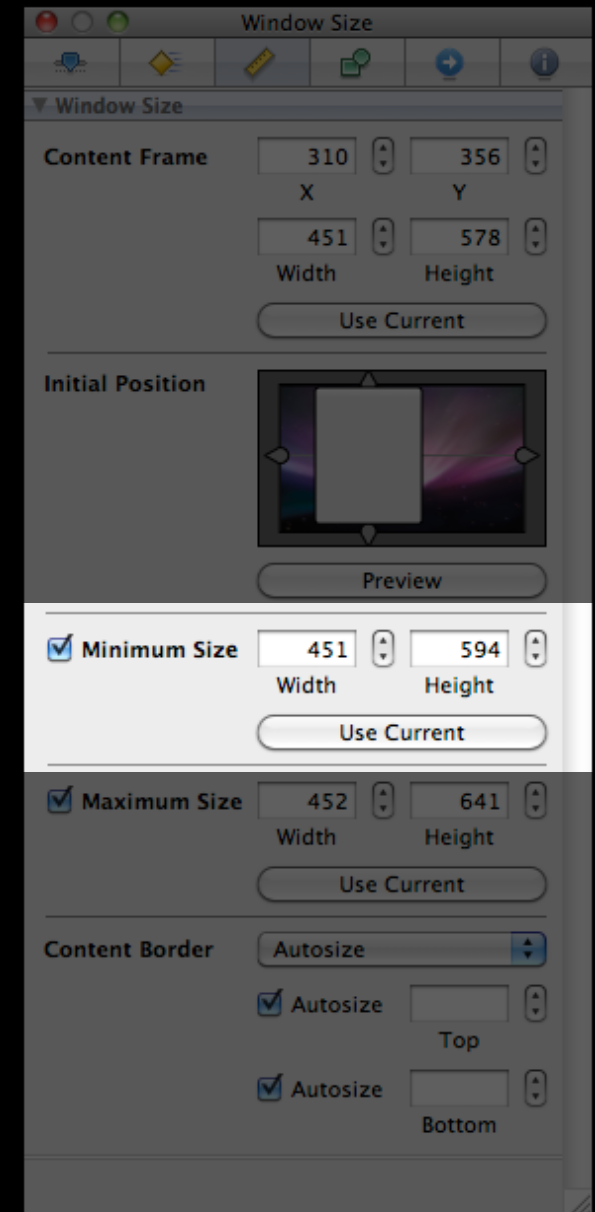
Perceivable

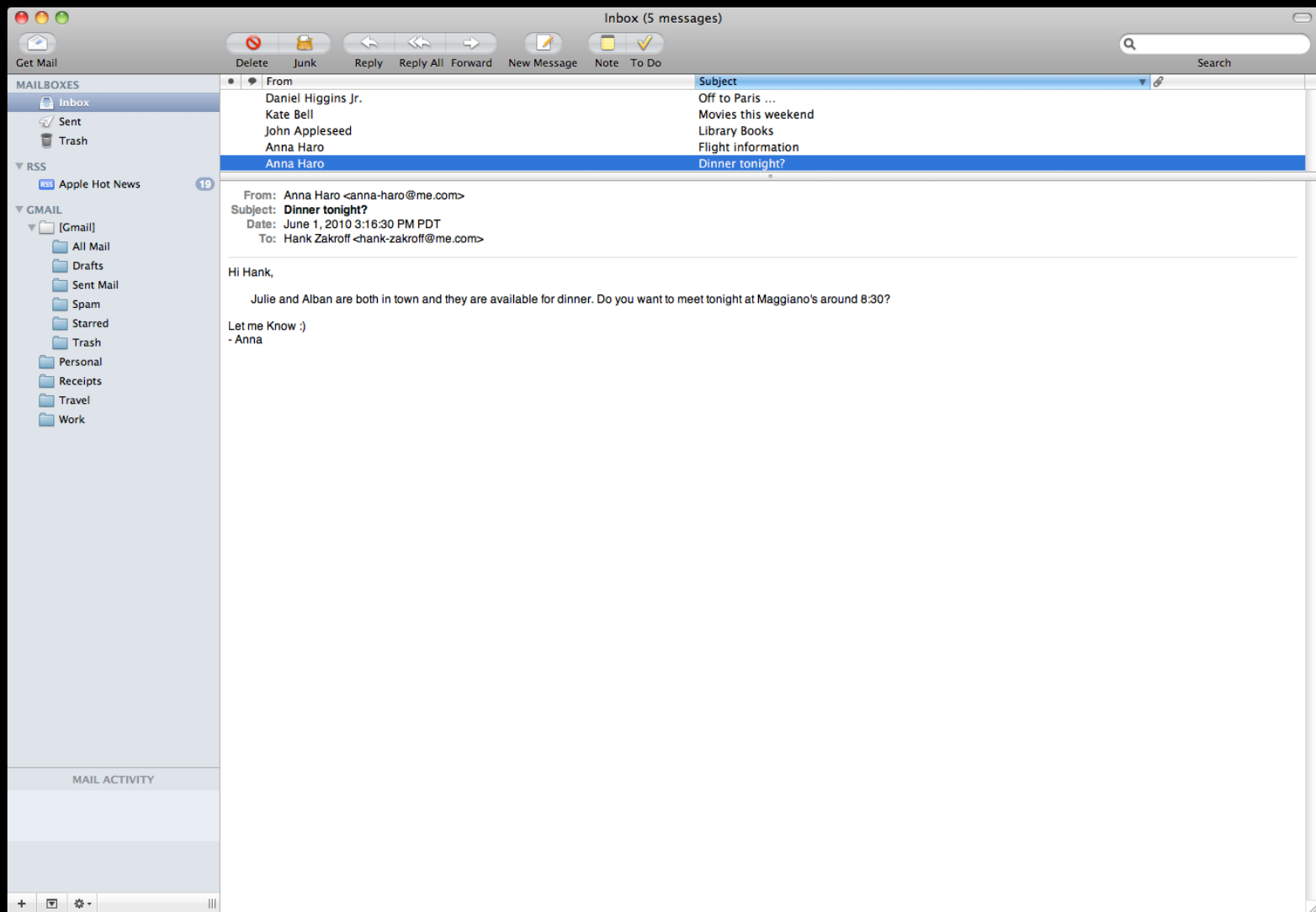


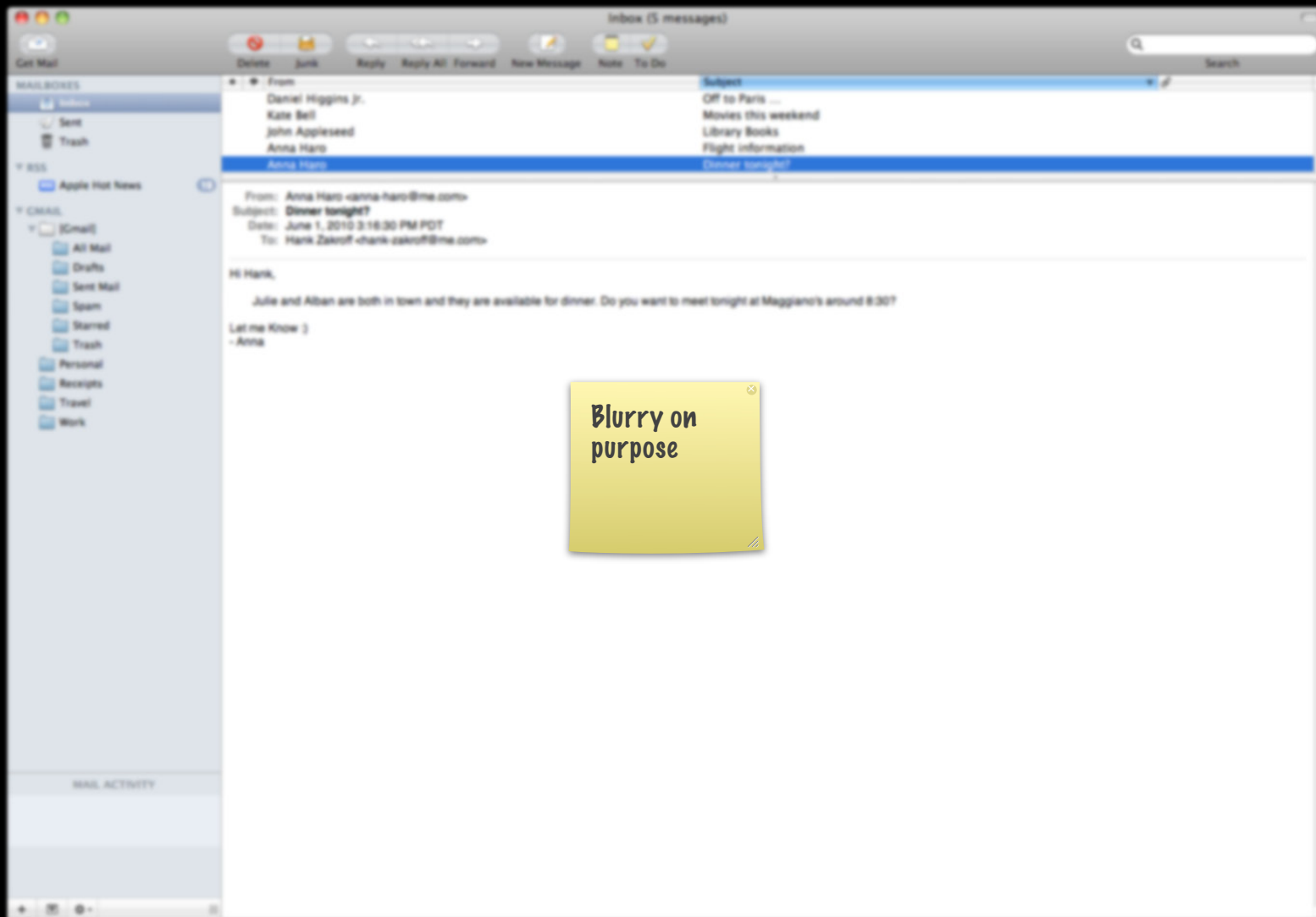


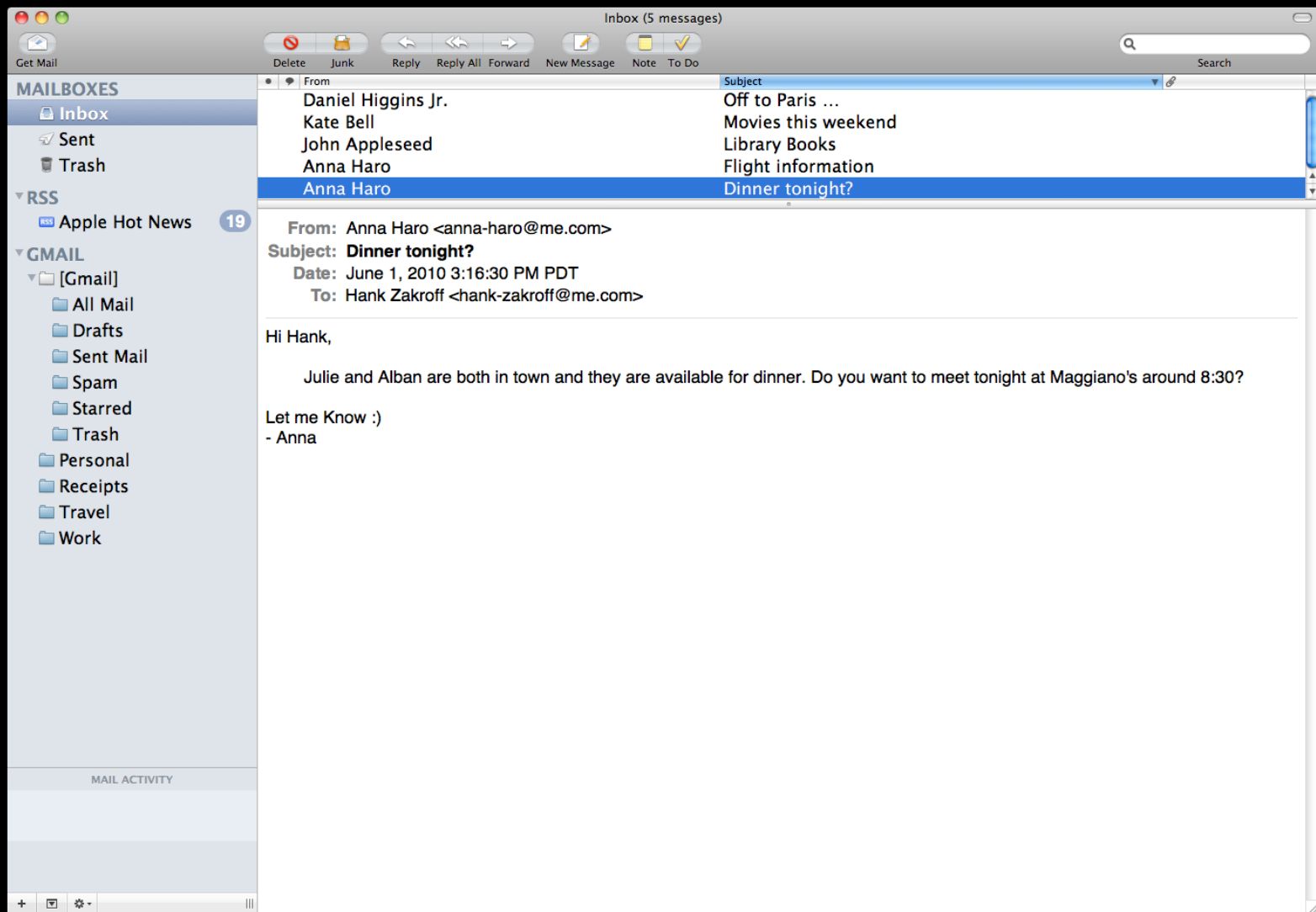
Resolution

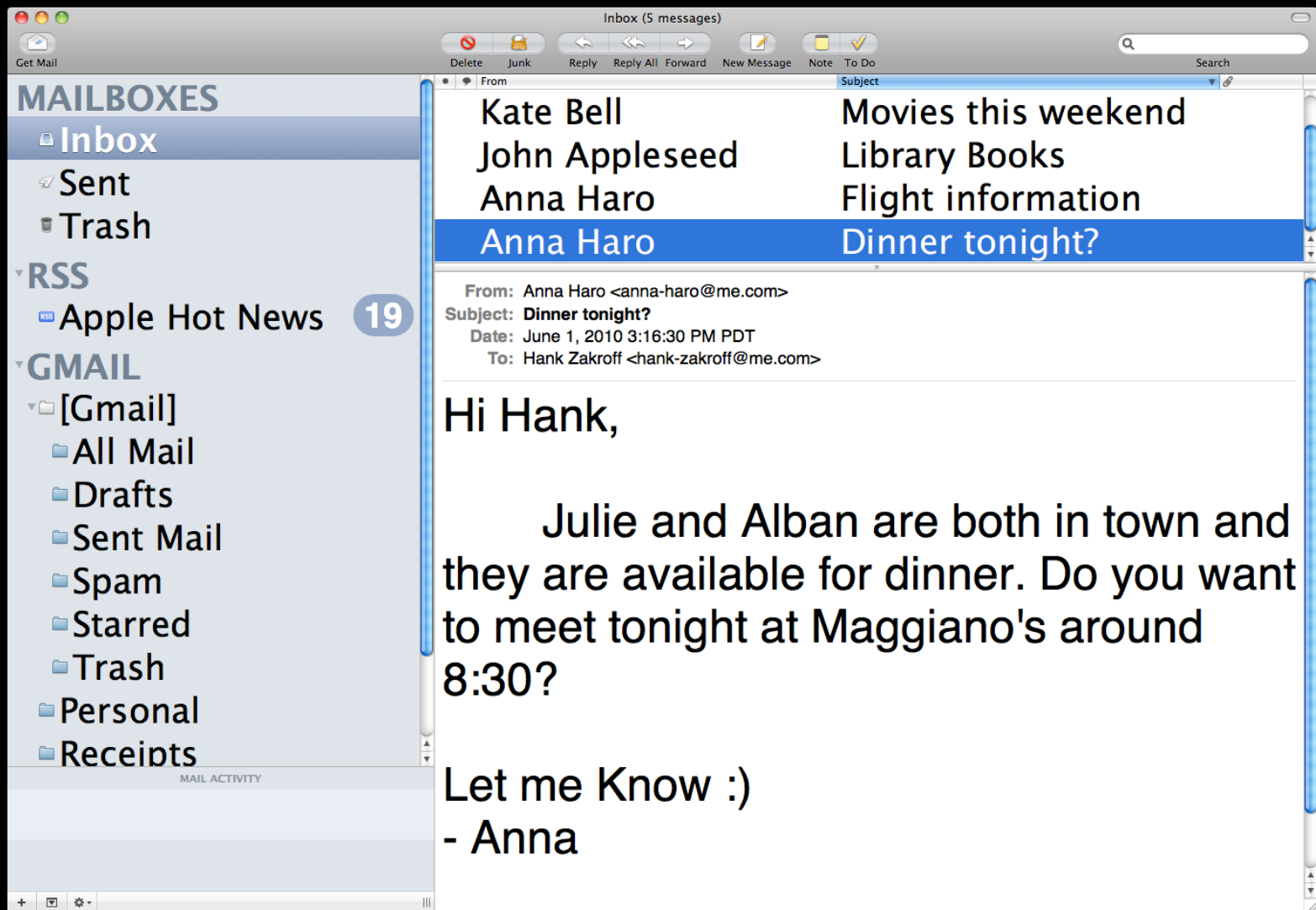
- Usable at low resolutions
 - 1024x768 recommended
 - Aids users with visual impairments
 - Aids elderly users
 - Helps when displaying on a projector





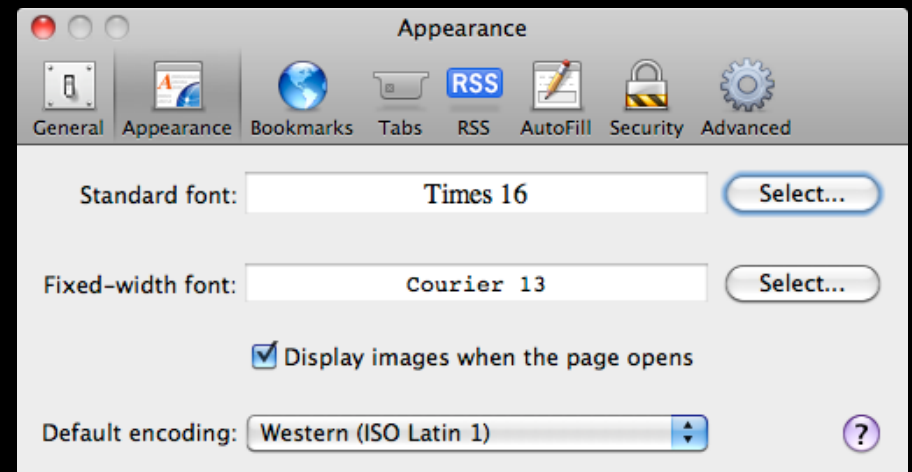






Font Size

- Provide adjustable font sizes for key UI
 - Aids users with visual impairments
 - Aids elderly users
 - Helps during demonstrations



Adjust UI Font Size

```
- (NSUInteger)adjustedSystemFontSize
{
    NSUserDefaults *defaults = [NSUserDefaults standardUserDefaults];
    CGFloat fontSize = [defaults floatValueForKey:@"fontSize"];
    if ( fontSize < 8.0f )
    {
        return [UIFont systemFontOfSize];
    }
    return fontSize;
}
```

Adjust UI Font Size

Adjust system fonts

```
- (UIFont *)adjustedSystemFont
{
    CGFloat newSize = [self adjustedSystemFontSize];
    return [UIFont systemFontOfSize:newSize];
}
```

Adjust UI Font Size

Apply to an element

```
- (void)updateFonts
{
    [myTextLabel setFont:[self offsetFontForElement:myTextLabel];

    [myTextLabel2 setFont:[self offsetFontForElement:myTextLabel2];
}
```

Adjust UI Font Size

Apply to an NSTable

```
- (void)updateFonts
{
    NSLayoutManager *layoutManager = [[NSLayoutManager alloc] init];
    NSFont *newFont = [self adjustedSystemFont];

    for ( NSTableColumn *column in [myTable tableColumns] )
    {
        id dataCell = [column dataCell];
        [dataCell setFont:newFont];
    }

    CGFloat desiredHeight = [layoutManager defaultLineHeightForFont:newFont];
    [myTable setRowHeight:desiredHeight + 1];
    [layoutManager release];
}
```


DOW J

+ 0.30 %

Nasdaq

- 0.12 %



DOW J

0.30 %

Nasdaq

0.12 %



DOW J

+ 0.30 %

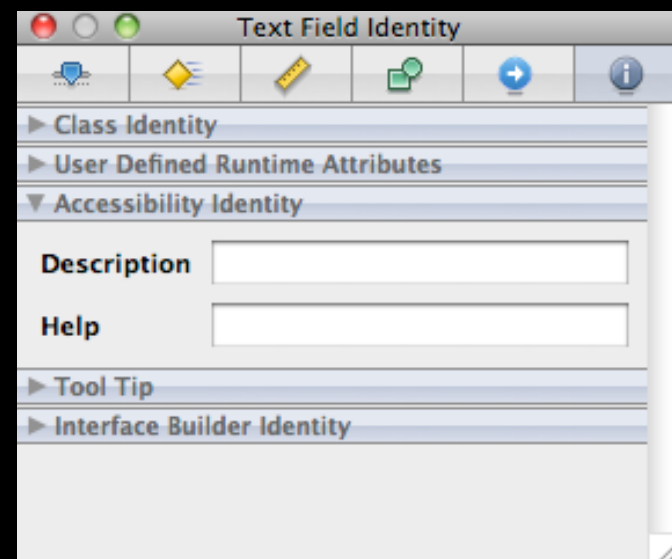
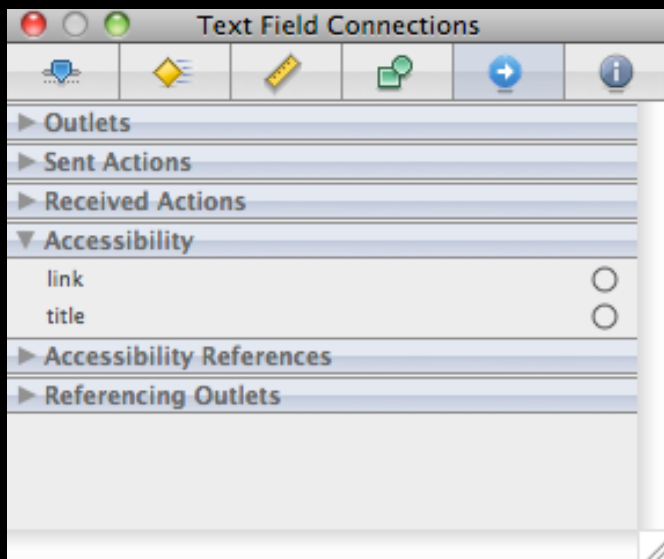
Nasdaq

- 0.12 %

Blank on purpose

Accessibility API

Most items can be given a description in Interface Builder



NSAccessibility

Programmatic accessibility

- Convenience method for anything that can be set in IB

```
- (void)accessibilitySetOverrideValue:(id)value  
    forAttribute:(NSString *)attribute
```

Demo

Auditory Considerations

Perceivable



Blank on purpose



Blank on purpose



and they come standard on all and
all of every new Mac. as

Blank on purpose

Auditory Considerations

- Don't provide audio-only feedback
- All sounds should work in mono audio
- Be conscious of sound frequency choices
- Consider allowing user-selectable sounds

Dock Icon

Change icon to represent state



Dock Icon

Change icon to represent state



Dock Icon

Change icon to represent state



Dock Icon

Change icon to represent state

```
NSImage *myImage = [NSImage imageNamed:imageName];  
[NSApp setApplicationIconImage: myImage];
```



Dock Icon

Badge the icon

```
[[NSApp dockTile] setBadgeLabel:@"1"];
```



Dock Icon

Bounce your icon

```
[NSApp requestUserAttention:NSCriticalRequest];
```



Dock Icon

Bounce your icon

```
[NSApp requestUserAttention:NSCriticalRequest];
```



Dock Icon

Bounce your icon

```
[NSApp requestUserAttention:NSCriticalRequest];
```



Demo

Physical Considerations

Operable





Physical Considerations

Provide interaction alternatives

- Provide keyboard shortcuts for common tasks
- Ensure full keyboard navigation
- Provide keyboard alternatives to mouse actions

Drag and Drop Keyboard Support

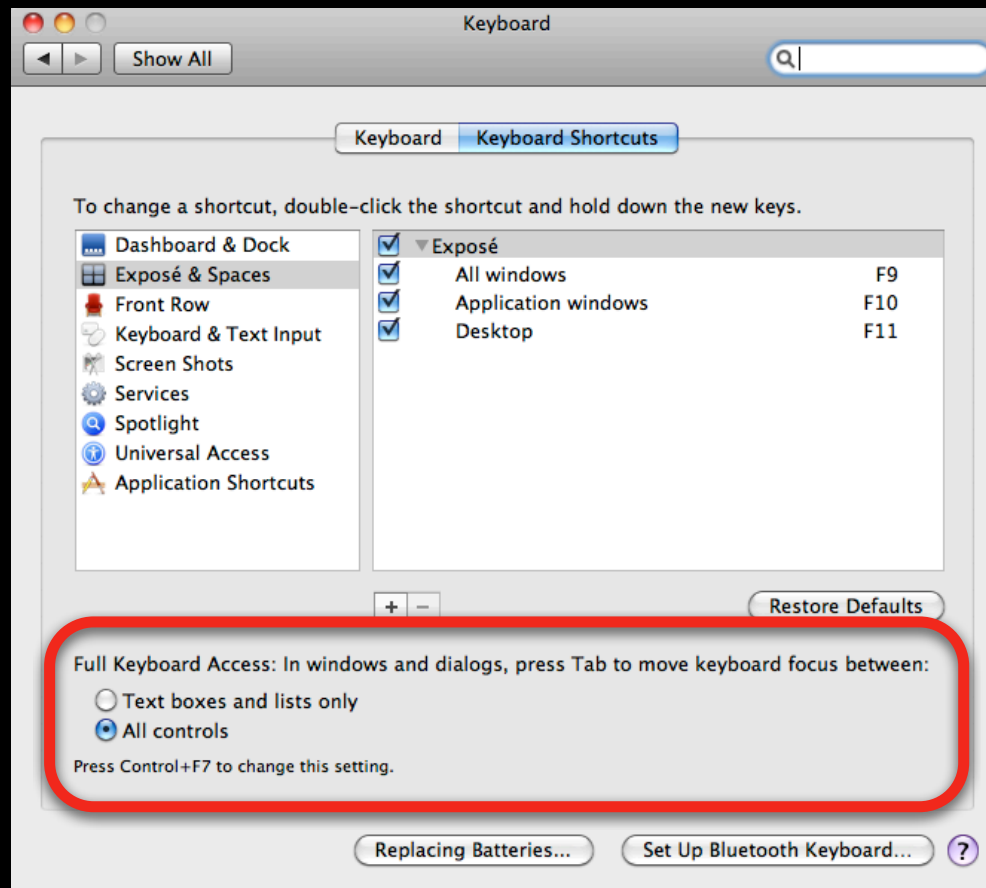
Provide a keyboard shortcut

- Add commands to change ordering
- Add cut/copy/paste support alongside drag and drop

Undo	⌘Z
Redo	⇧⌘Z
<hr/>	
Cut	⌘X
Copy	⌘C
Paste	⌘V
Delete	
Select All	⌘A
<hr/>	
Move Up	⌘↑
Move Down	⌘↓
<hr/>	
Find	▶
Spelling and Grammar	▶
Substitutions	▶
Transformations	▶
Speech	▶
<hr/>	
Special Characters...	

Enable Full Keyboard Access

Check tab order

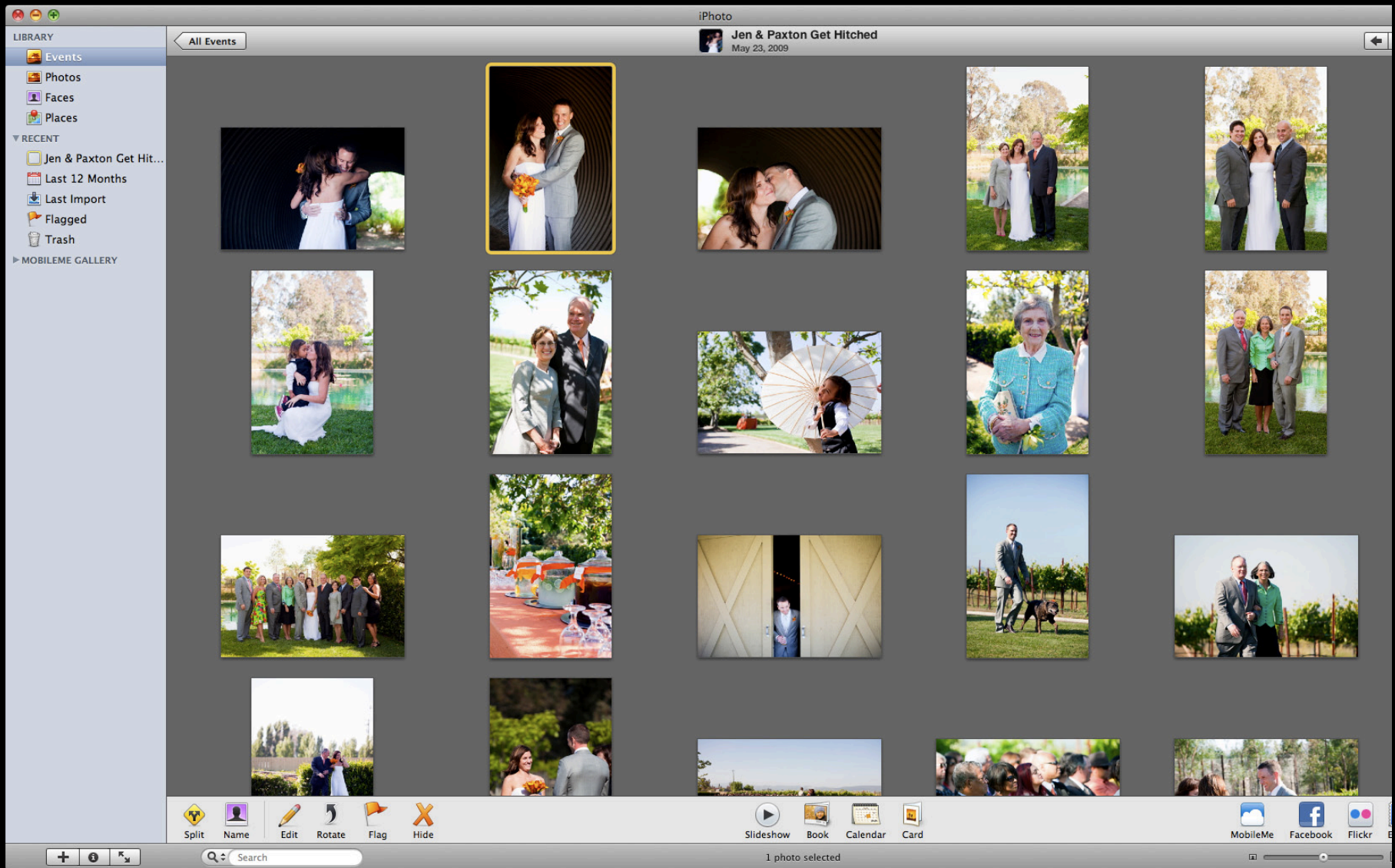


Demo

Cognitive Considerations

Understandable









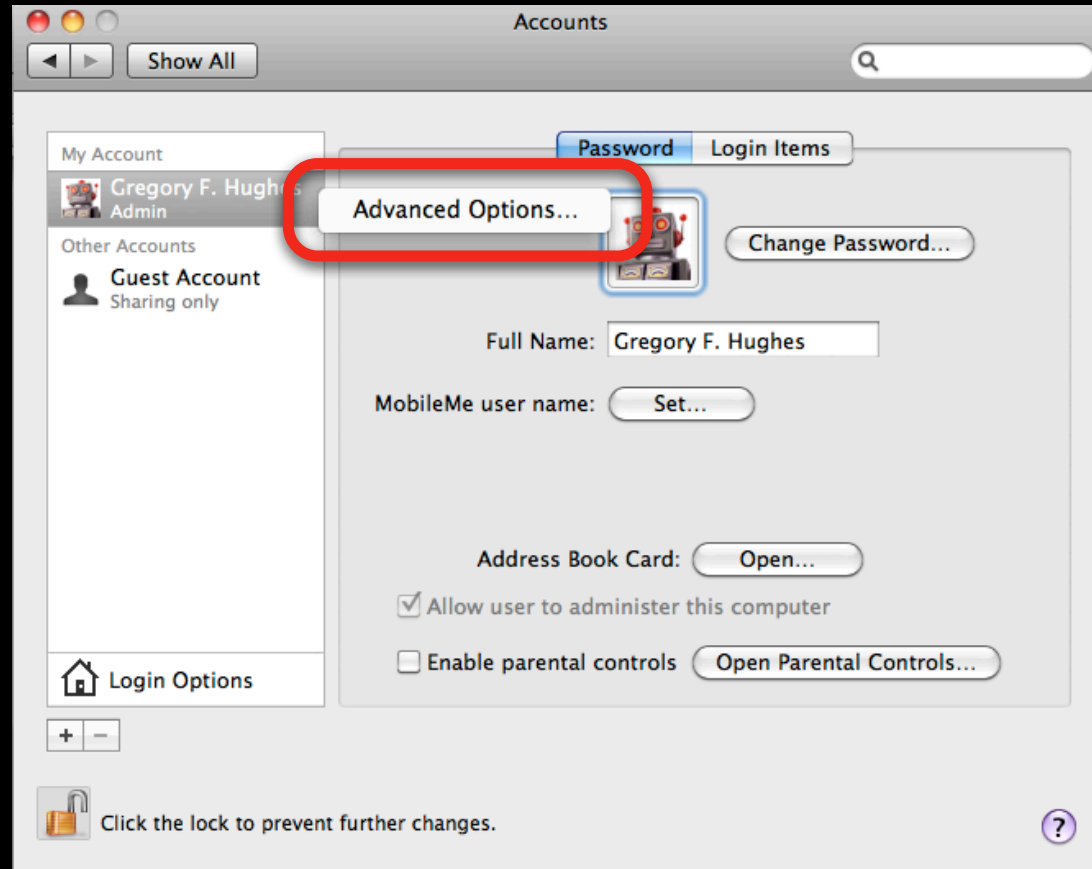


Fullscreen Mode

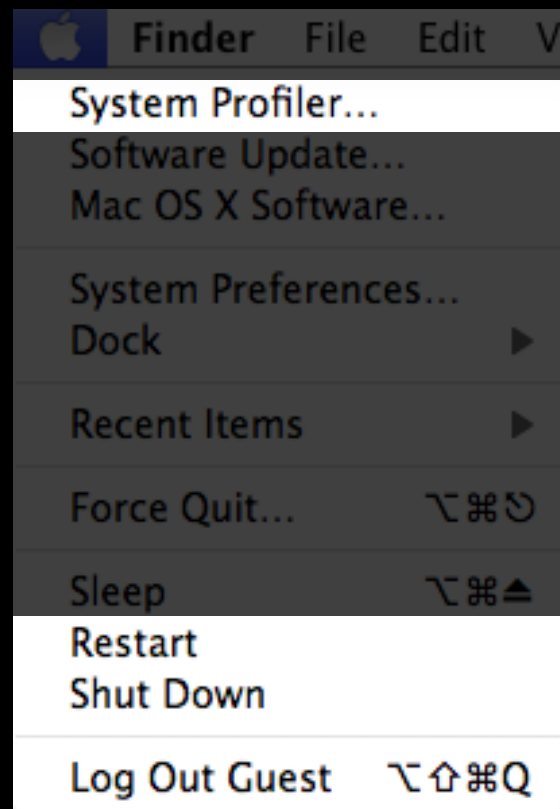
Bring an NSView into fullscreen to limit distractions

```
- (IBAction)enterFullScreen:(id)sender
{
    [fullScreenView enterFullscreenMode:[NSScreen mainScreen] withOptions:nil];
}
```

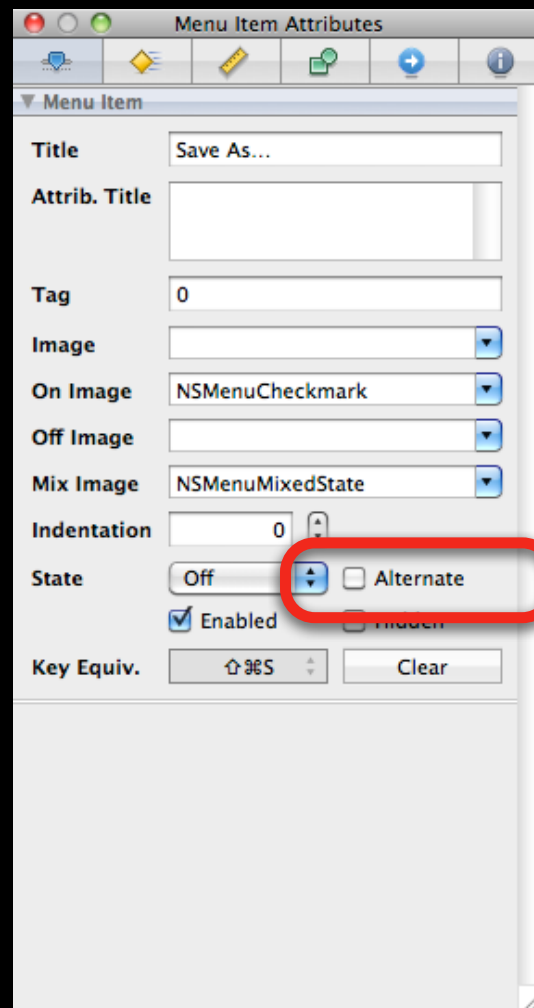
Hiding Advanced UI



Hiding Advanced UI



Hiding Advanced UI



Demo

Summary

Resolution

Font size

Color choice

NSAccessibility API

Full keyboard access

Tab order

Menu shortcuts



Non-audible feedback

Closed captions

Mono audio



Simplify interface

Hide advanced options

Fullscreen mode

More Information

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Accessibility Mailing List

Public developer list
accessibility-dev@lists.apple.com

Documentation

<http://developer.apple.com/wwdc>

Apple Developer Forums

<http://devforums.apple.com>

Accessibility Web Page

www.apple.com/accessibility



Apple - Accessibility

http://www.apple.com/accessibility/

Store Mac iPod iPhone iPad iTunes Support Search

Accessibility

Overview Mac OS X iPhone iPod + iTunes Resources



Apple's Commitment to Accessibility

For more than 20 years, Apple has provided new and innovative solutions for people with disabilities, allowing them to access — and enjoy using — the Mac, iPod, iPhone, and Apple TV.

Apple includes assistive technology in its products as standard features — at no additional cost. For example, iPhone, iPod, and Mac OS X include screen

Latest in Accessibility

iPad
iPad comes standard with accessibility features that help people with disabilities experience all that it has to offer.
[Learn more about iPad](#)

iPhone 3GS and iPod touch
The new iPhone 3GS and iPod touch include a built-in screen reader, full-screen magnification, and other new accessibility features.
[Learn more about iPhone 3GS](#)
[Learn more about iPod touch](#)

Mac OS X Snow Leopard
VoiceOver 3 sets a new standard in

Related Sessions

Accessibility on iPhone OS

Nob Hill
Wednesday 4:30PM

Labs

OS X Accessibility Lab

Application Frameworks
Lab B
Tuesday 2:00PM

iPhone Accessibility Lab

Application Frameworks
Lab B
Thursday 9:00AM



