### Mobile App Development

#### The Demand for MAD Courses
Mobile App Development (MAD) has received a copious amount of attention in recent years.

- **Student interest:**
  - CNN Money naming Mobile App Developer the "Best Job in America" in 2017 [1]
  - Almost all students have an iPhone or Android phone

- **Demand for jobs:**
  - PayScale reporting a 19% 10-year job growth for MAD, placing it at #9 in the list of fastest-growing jobs in America [2].
  - High starting salaries

#### Barriers to Offering MAD Courses
Limited expertise:
- Faculty often have not taken a MAD course themselves
- Need to learn... but how to find the time!?  
- May need to hire an adjunct from industry

Limited resources:
- Requires a Mac lab or students to have Macs for iOS development
- Phones, tablets, smart watches, etc. may be desired for projects

#### Student Pre-requisite Knowledge
MAD requires students be comfortable with:
- An object-oriented programming language
- Debugging/reading stack traces

MAD prefers students have exposure to:
- Graphical user interface (GUI) programming
- Event-drive programming
- Design patterns
- APIs and frameworks
- Integrated development environments (IDEs)

#### Who Wants to Take a MAD Course?
A diverse group of students, including:
- Primarily CS Majors and CS Minors
- Some business students
- Some science students

### Course Assignments/Projects

<table>
<thead>
<tr>
<th>Example Assignment #1: Application Programming Interfaces (APIs)</th>
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<tbody>
<tr>
<td>- <strong>Android:</strong> Google Maps SDK, location services, menus, app permissions</td>
</tr>
<tr>
<td>- <strong>iOS:</strong> Google Maps Places web API, Core Location, threading, searching</td>
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<tr>
<th>Example Assignment #2: Persistent Storage</th>
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<tr>
<td>- <strong>Android:</strong> ListViews, SQLite databases, contextual action mode, navigation</td>
</tr>
<tr>
<td>- <strong>iOS:</strong> TableViews, Core Data, camera, image picker, navigation controller</td>
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<th>Example Assignment #3: Layouts</th>
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<tr>
<td>- <strong>Android:</strong> Grid layout, multi-screen apps, working with images, toasts</td>
</tr>
<tr>
<td>- <strong>iOS:</strong> Auto layout, linear layout, timers, working with emoji, alert dialogs</td>
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### Android vs. iOS

#### Programming Language
- Recommended for Android: Java (primary, older)
- OR Kotlin (secondary, newer)

- Java-specific topics:
  - Interfaces, functional interfaces
  - Anonymous classes
  - Lambda expressions

- Recommended for iOS: Swift (primary, newer)
- OR Objective-C (secondary, older)

- Swift-specific topics:
  - Optionals, protocols
  - Closures, functions as value types

#### IDE
- Android: Android Studio (based on the IntelliJ platform, cross-platform)
  - Emulator (a little slower)
  - Xcode (for Mac only)
  - Simulator (a little faster)

#### Fun/Relevant Topics
- Model, View, Controller
- Callbacks/event handling
- Delegation and data source patterns (iOS)
- Lifecycle methods and threading
- SpriteKit 2D games (iOS)
- Working with APIs
- Material design (Android)
- CocoaPods dependency manager (iOS)

### Teaching Mobile App Dev

**Teach a MAD Course, it's Fun!!**

**But Android or iOS?**

Android...probably. Android is cross-platform (you don't have to purchase/require Macs), uses Java so you can start writing apps quicker (don't need to teach a new language, can rely on Java/C++ pre-requisite knowledge), and is open-source. However, build issues across versions/libraries are common and the majority of students would rather learn iOS because they (generally) have iPhones. It is quicker for a faculty member to learn Android development, but Apple does have a nice iOS book I recommend.

### Resources to Learn

My MAD course content (notes, programming assignments, etc.) is publicly available online:

- **Android**:
  - Materials: [https://goo.gl/9X1HA1](https://goo.gl/9X1HA1)
  - Code: [https://github.com/GonzagaCPSC312](https://github.com/GonzagaCPSC312)

- **iOS**:
  - Code: [https://github.com/GonzagaCPSC315](https://github.com/GonzagaCPSC315)

Great online learning resources:

- Apple's Swift Programming Language book
- Apple's App Development with Swift book
- Online courses like Udemy, Treehouse, etc.

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### Native vs. Hybrid vs. Web

- **Native**:
  - Full capability
  - Single platform
  - Access to native platform App store distribution

- **Hybrid**:
  - Partial capability
  - Multiple platforms
  - Access to native platform App store distribution

- **Web**:
  - Partial capability
  - Multiple platforms

Image from [3]