MICHIGAN STATE
U N I V E R S I T Y

01/12: Project Plan

The Capstone Experience

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From Students…
…to Professionals

Project Plan

➢Functional Specifications

• Design Specifications

• Technical Specifications

Functional Specifications

- ## What does it do?
  (Not "how" does it do it?)
  - What's your client's problem?
  - What's your solution?

- ## Includes
  - List of Objectives
  - Use Cases

- ## Not Necessarily Complete

- ## Understandable by End User

- ## Initial Problem Statement

- ## Usually Refined

Functional Specifications

- Amazon
  - Improve Amazon Customer Shopping Experience
  - Enable More Informed Purchase Decisions
  - Provide Automatic Analysis of Product Reviews
- MSUFCU
  - Expand Digital Banking Offerings
  - Build Amazon Alexa Service
  - Develop Apple Watch App
- Spectrum Health
  - Assist Resident Physicians Becoming Doctors
  - Enable Residents to Track Their Shift Times

Understandable
by End User

Functional Specifications Interactions With Your Client

- Derived With/From Client

- Documented For Client

- Presented to Client

- Agreed Upon With Client

- Your Job to Capture the Client's Intent!

Project Plan

✓Functional Specifications

➢Design Specifications

• Technical Specifications

Design Specifications

- What's the user experience (UX)?
  - How does a user use it?
  - How does it look and fee?
- Includes
  - Business Process Flow
  - Specific Features
  - Use Cases
  - Screen Mockups
  - Data Flow Diagrams
  - Data Organization
  - Etc…
- Identifies All the Parts and Their Interactions
- (Mostly) Understandable by End User
- Usually Refined

Design Specifications

- Auto-Owners
  - Support Role-Based Authentication and Authorization
  - Handle Location Based on Address or GPS
  - Enable Claims Submission
  - Visualize Mapping of Customers Nearby
    - Policyholders
    - Claims
    - Proposals
  - Provide Administrative Web Portal
- Humana
  - Usable by 6 – 12 Year Olds
  - Implement as Android Launcher
  - Handle Various Interactions
    - Surveys for Parents and Kids
    - Tips for Parents
    - Quizzes for Kids
  - Include Coins and Badges as Awards
  - Utilize Natural Language Processing and Machine Learning
  - Provide Web App for Parents
- Urban Science
  - Analyze Real-Time In-Flight Digital Marketing Data
    - Consumer Engagement
    - Demographic Inclusion
    - Delivery Effectiveness
    - Overall Performance
    - Return on Investment
  - Leverage Machine Learning to Recommend Actions
  - Enable Changes to Active Campaign Variables

## Mostly Understandable by End User

Screen Mockups

- User Interface Only
  - Shows Layout, Buttons, Pull-Downs, Etc…
  - Non-Functional
  - No Back End
- Helpful for Developing
  - Functional Specifications
  - Look-and-Feel
  - Use Cases
- Can Create with…
  - Pencil and Paper
  - PowerPoint (Developer View)
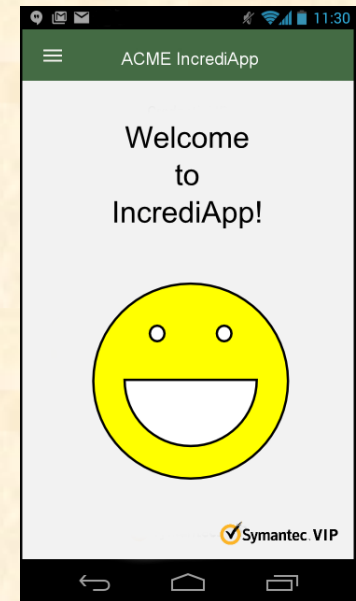 - Photoshop
  - Etc…
- NOT Screen Captures of Other Software
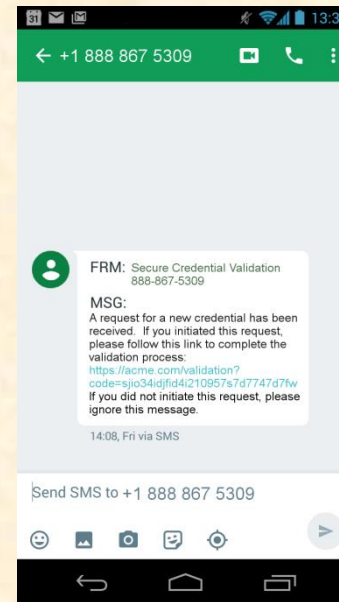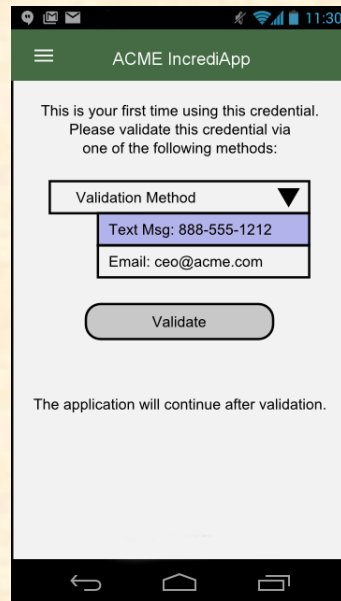
Screen Mockups

- "Use" with Clients
  - Show to Clients
  - Go Through Use Cases with Clients
- "Cruder" may be better.
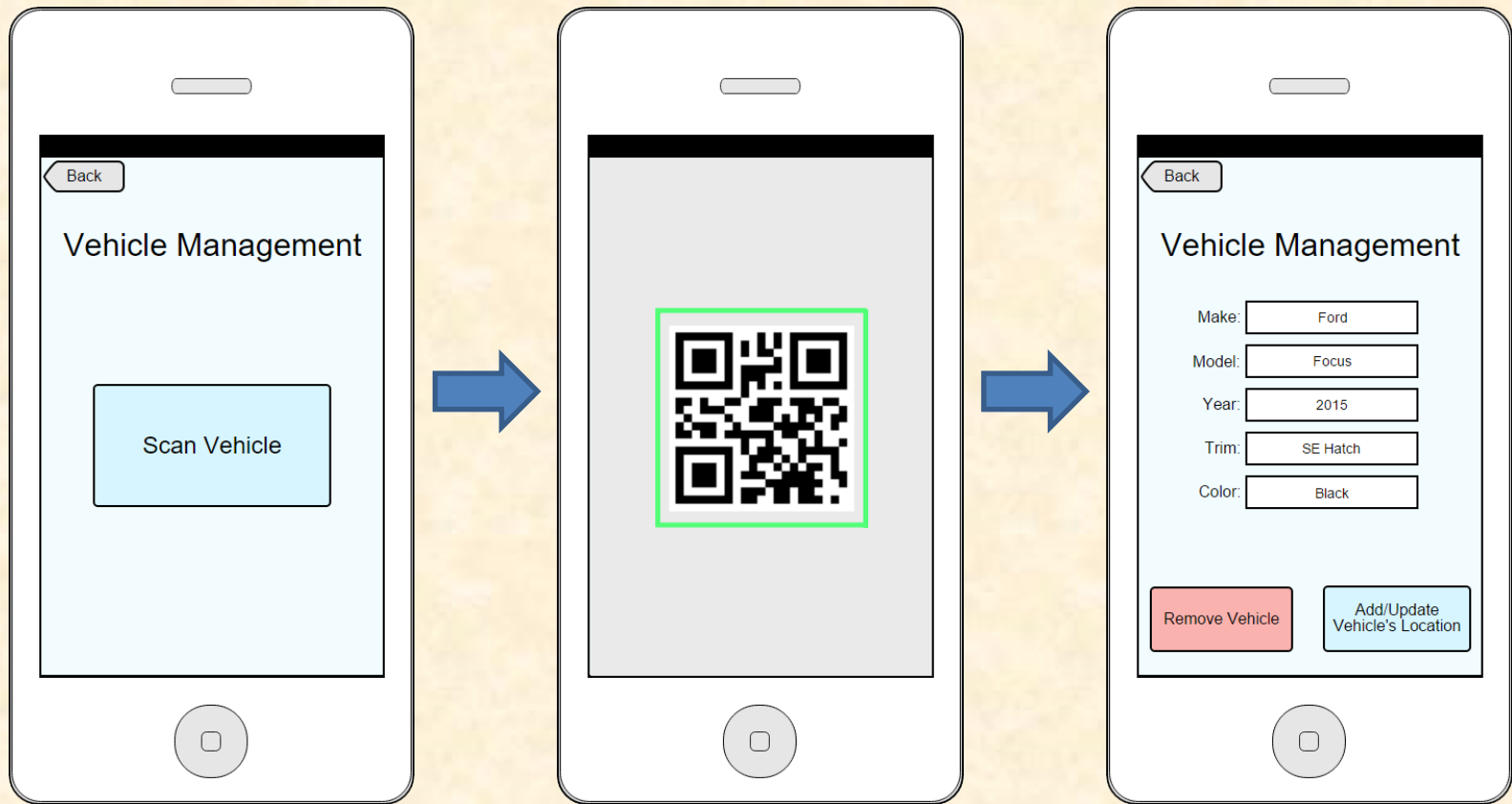 - What?
  - Why?

Screen Mockup Example
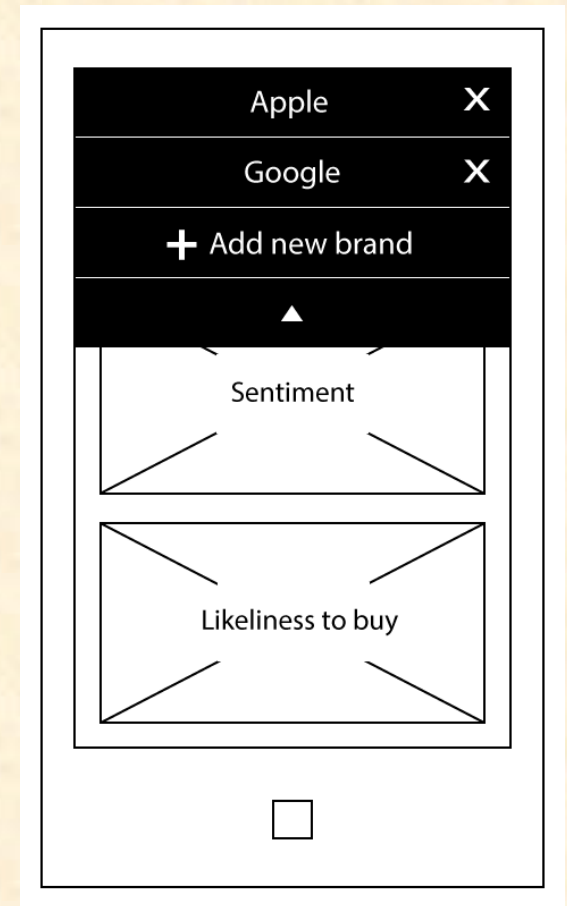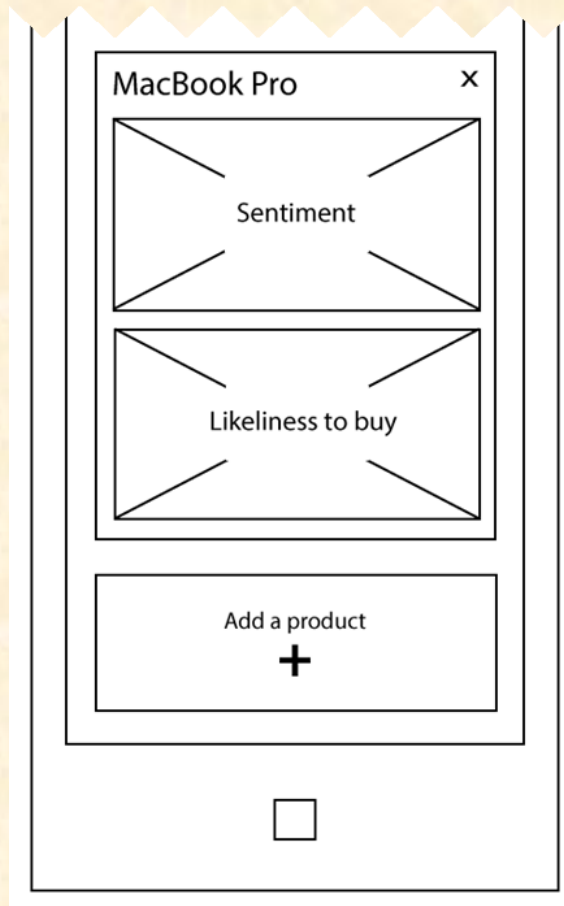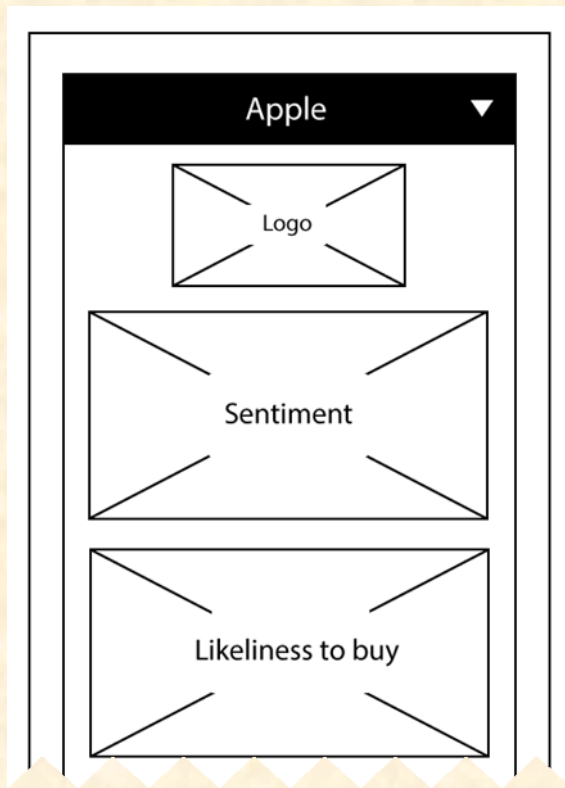
Screen Mockups Example

Screen Mockups Example

Design Specifications Interactions With Your Client

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Project Plan

✓Functional Specifications

✓Design Specifications

➢Technical Specifications

Technical Specification

- How does it do it?
- Identifies All the Parts and Their Interactions
- Everything a Developer Needs to Write the Code
- Includes Things Like…
  - Overall System Architecture
  - Machine Architectures
  - Software Technologies
  - Production Environments
  - Development Environments
  - SDK's (Software Development Kits)
  - Network Topology
  - Database Schema
  - Continued…

Technical Specification

- Includes Things Like…
  - Object Models and Class Diagrams
  - UML Diagrams
  - Pseudo Code
  - Function Prototypes
  - Schedule
  - Test Plan
  - Risk Analysis
  - Etc…
- Probably Not Understandable by End User
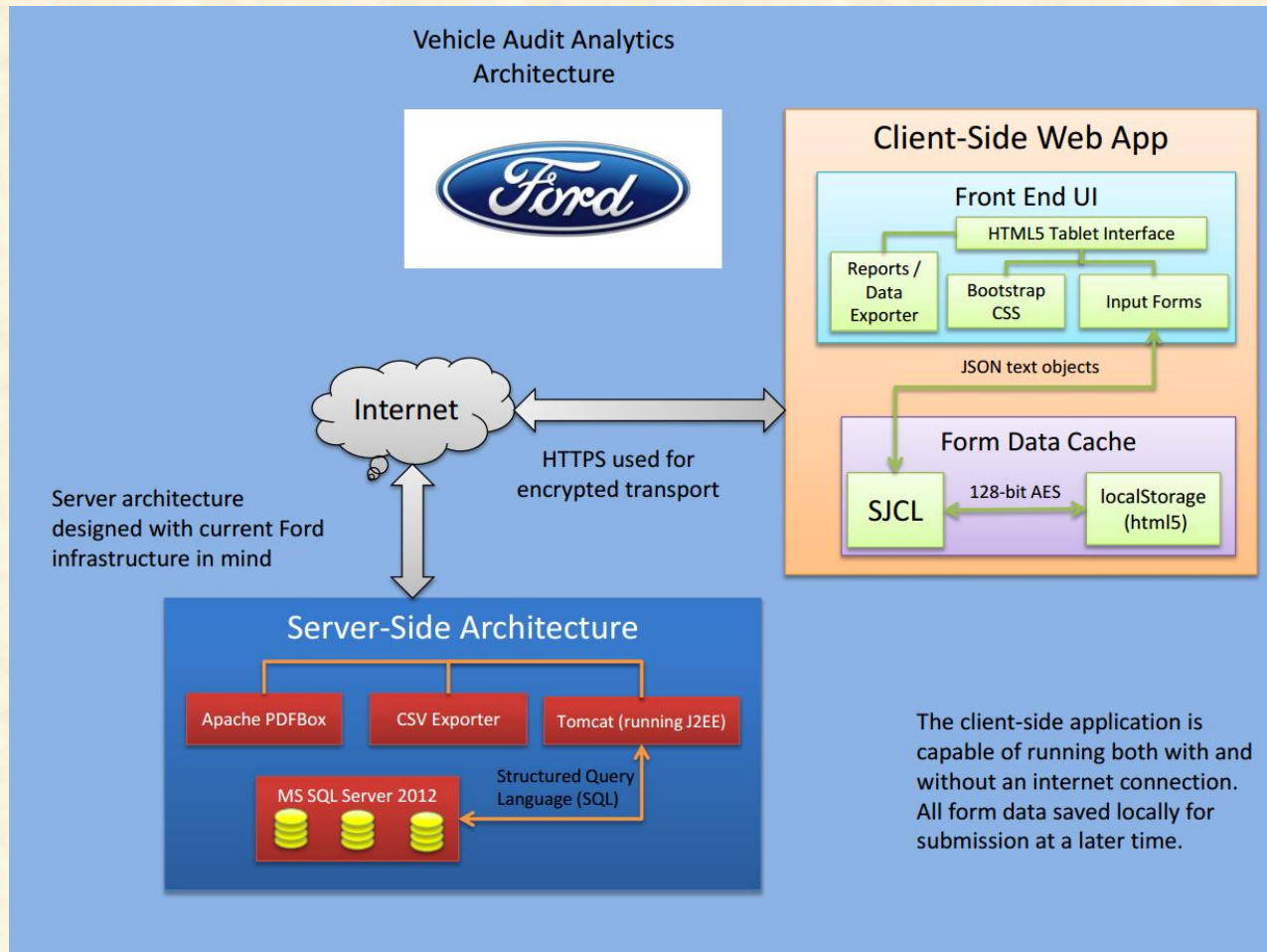- Usually Refined

Technical Specifications

- Michigan State University
  - Apple iPads and iPhones (iOS) / Swift
  - Google Android Tablets and Phones / Java
  - Global Positioning Systems
  - RESTful Web Services
- Microsoft
  - Google Android Tablets and Phones / Java
  - Apple iPads and iPhones (iOS) / Swift
  - Microsoft Windows / C#
  - Microsoft Bot Framework
  - Natural Language Processing
  - RESTful Web Services
- Mozilla / Firefox
  - XUL
  - XHTML
  - JavaScript / EcmaScript 2016 & 2017
  - CSS
  - IRC
  - Bugzilla
  - Mercurial

Probably <u>Not</u> Understandable by End User

System Architecture Example

System Architecture Example

Update each week

Converts to element tree

Parse into SQL server

Product catalog

Mobile Devices

Server Architecture

SQL Based

Catalog Table

Secured by SSH

Pulled from server

Cache in device memory
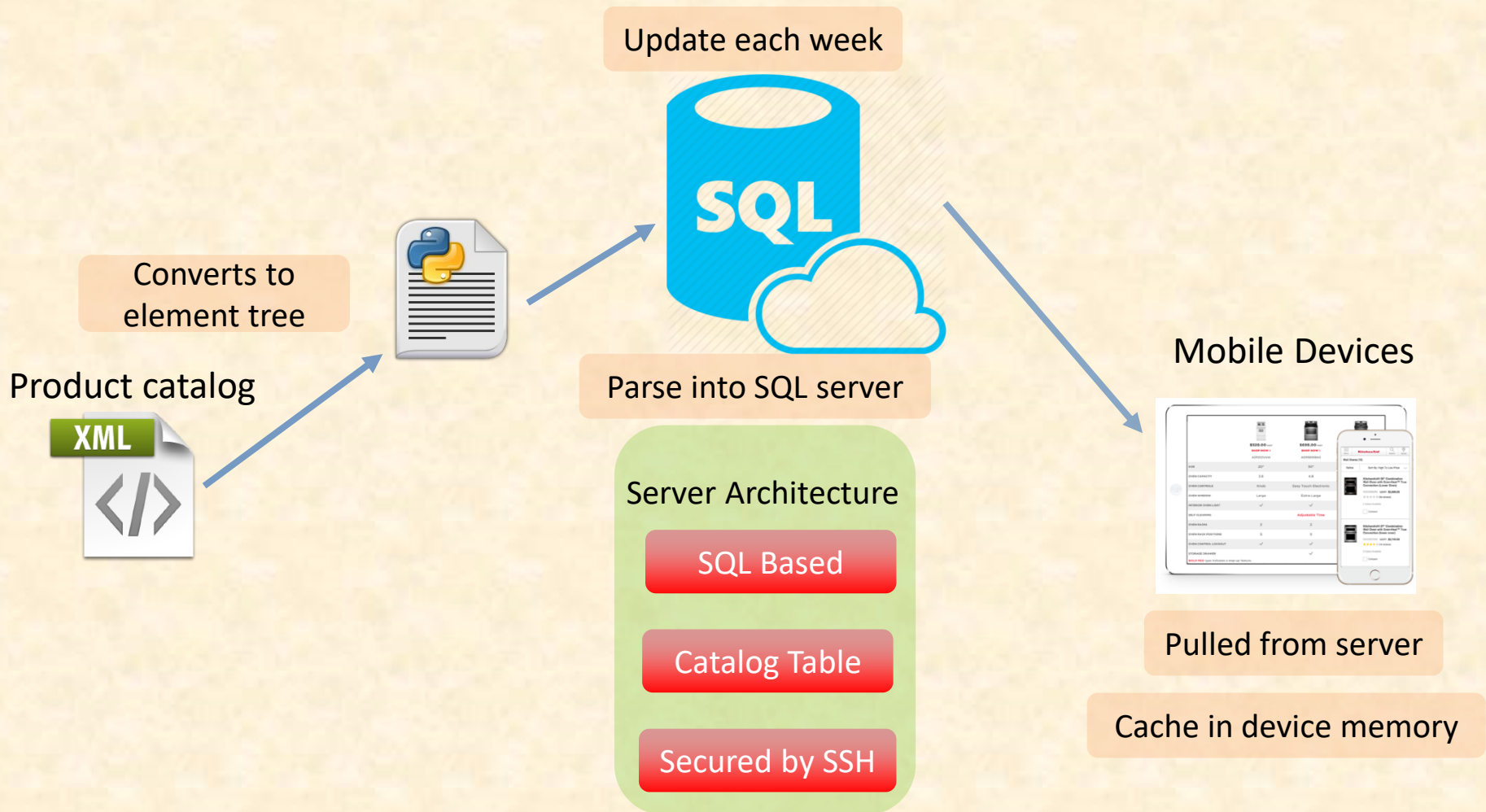
System Architecture Example
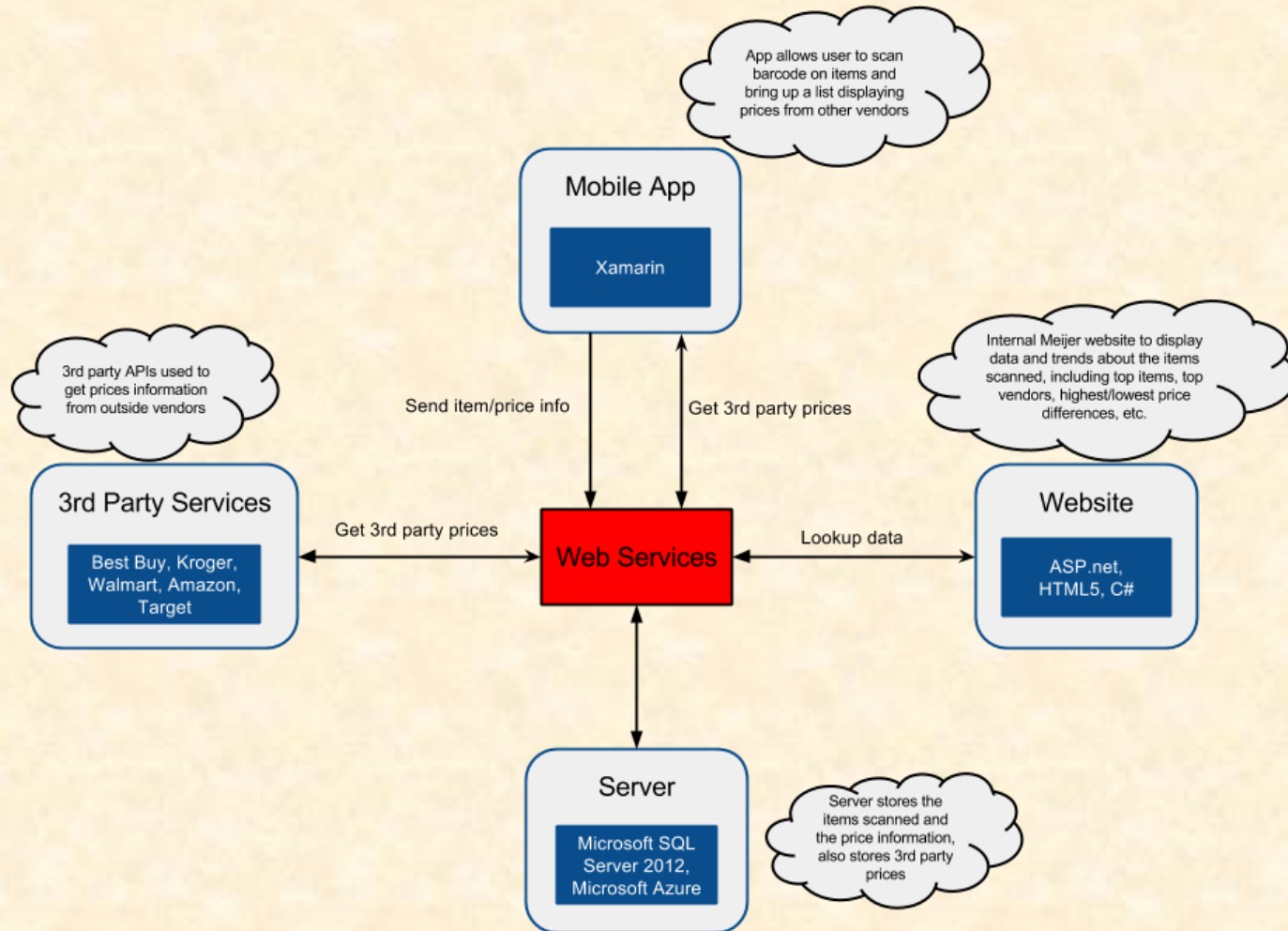
Approach

- Break Big Problems Into Smaller Problems
- Identify Constraints
- Identify "Risks"—Things You Don't…
  - …Know
  - …Understand
  - …Know How To Do
- Consider Tradeoffs
- Select Appropriate Technologies
- Identify Core Features for a Prototype

Technical Specifications Interactions With Your Client

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Cannot be emphasized enough!

Project Plan Summary

- Specifications
  - Functional: What does it do?
  - Design: How does it look and feel?
  - Technical: How does it do it?
- Testing Plan
- Schedule

How To's

- Quickly identify…
  - …what you don't know,
  - …what you don't understand, and
  - …what you don't know how to do.
- Conceptually…
  - Start with functional specifications.
    - Get agreement with client.
    - Include as first part of project plan.
  - Do design specifications.
    - Get agreement with client.
    - Include as 2nd part of project plan.
  - Do technical specifications.
    - Get agreement with client.
    - Include as 3rd part of project plan.
  - Do schedule.
  - Do development, testing, and deployment.
- In CSE498, must do all three in parallel (and iterate).

- Approach
  - Make Skeleton Document Immediately
    - Will Get You Organized and Focused
    - Include "Under Construction" Sections (Totally Empty)
  - Develop In Parallel When Possible But...
    - Complete Functional First
    - Complete Design Second
    - Complete Technical Third
  - Refine As Needed
  - Assign Sections to Team Members
  - Share with Client
    - Ask For (Specific) Feedback ← "Is this what you had in mind?"
    - Highlight What's New
    - Tricky Balance
      - Not Enough?
      - Too Much?

How To's

- Schedule
  - Dictated by Course
  - Schedules > Major Milestones
    - 01/19: Status Report Presentations
    - 01/31: Project Plan Presentations
    - 02/21: Alpha Presentations
    - 04/04: Beta Presentations
    - 04/25: Project Videos
    - 04/27: All Deliverables
    - 04/27: Design Day Setup
    - 04/28: Design Day
  - Other Milestones By Educated Guesses
  - Track To It At Least Weekly at Triage Meetings
  - Revisit Often and Revise If Necessary
  - Delivery Slippage == Graduation Slippage

How To's

- "Living Document"
- Make Sure Your Project Plan Has…
  - Cover Page
  - Title
  - Table of Content
  - Page Numbers
  - Headers and Footers
  - Etc…

  (That is, make sure your plan looks professional.)

Interactions With Client

Client May Specify…

- Requirements
  - Functional
  - Design
  - Technical Requirements
    - Operating Systems
    - Programming Languages and Environments
    - Web Technologies
    - Etc…
  - Legacy
- Milestones
- Etc…

(You may explore and propose other ideas.)

Nota Bene: Project Plan

- Must Use Windows Microsoft Office
    - Word and PowerPoint
    - Installed by Spencer.
    - Requires Windows VM. ⬅ Maybe
    - Get it done now!
    - (Do not attempt to use anything other than Windows Microsoft Office.)
- How many…
    - …drafts will you write? Many.
    - …drafts will you share with your client? A Couple.
    - …final documents will you submit for CSE498? One
- Due Date
    - 4:00 a.m., Tuesday, January 31
    - ~ 2.5 Weeks ⬅ Get on it, now!
- In Class Formal Presentations
    - January 31 – February 9
    - PowerPoint Template Provided

Resources on the Web

- ## Other Links > Downloads Project Plan Examples

  - ### Team Amazon

  - ### Team Rook

  - ### Team Whirlpool

- ## High Resolution Sponsor Logo

  www.capstone.cse.msu.edu/2017-01/projects/<sponsor>/images/originals/sponsor-logo.png
  http://www.capstone.cse.msu.edu/2017-01/projects/auto-owners/images/originals/sponsor-logo.png

Project Plan

✓Functional Specifications

✓Design Specifications

✓Technical Specifications

- Risks

- Prototypes ⎫ Future Meetings

- Schedule