01/26: Prototyping

Why? Answer Questions
Help Determine...
• Specifications
  ▪ Functional
  ▪ Design
  ▪ Technical
• Usability
• How Existing Code Works
• Programming Languages
• Development Environments
• Operating Environments
• What to Panic About
• Etc...

Why? Determine Schedule
Determine how long will it take to...
• ...learn the new programming language.
• ...learn the development environment.
• ...learn the existing code.
• ...convert the existing code.
• ...convert the existing database.
• ...get libraries working.
• ...deploy the application.
• Etc....

Why? Reduce Risk
• Operability
  ▪ How do we make a game clock?
  ▪ Where do we store the data?
• Interoperability
  ▪ How does the game clock work with other tablets?
  ▪ How do the tablets all write to the same database?
• Scalability
  ▪ Will the game clock propagate in real time?
  ▪ Will the database engine keep up?
• Reliability
  ▪ What happens if the clock tablet dies?
  ▪ What happens if the database tablet dies?
• Etc....

Speed (to Write)
• Critical
• 2-3 Day Tasks
• Use Whatever Works
  ▪ RAD Languages
  ▪ SDK’s
  ▪ IDE’s
  ▪ Design Tools
  ▪ Wizards
  ▪ Sample Code
  ▪ Etc...
• Stop When Questions Answered

Prototypes
• Developed
  ▪ Early
  ▪ Rapidly
• Implement Subset of the Requirements
• Done for Variety of Reasons
• Are Not Finished Goods
• “Hacking” (Good Sense)
Tradeoffs: Speed (to Write) vs...

- Testing
- Documentation
- Security
- Software Engineering Best Practices
- Usability
- Performance
- Coding Standards
- User Interface Standards
- Using Real Data
- Etc...

Hence, Normally Not Appropriate in Final Deliverable

Challenge/Danger

- “Hack” Solution
  - It works.
  - It’s *a* way to do something.

- “Correct” Solution
  - It works.
  - It’s the “right” way to do something.

(There may be more than one “right” way to do something.)

Prototypes: Case Studies

Basketball
- Play Effectiveness
- Player Timer
- Radio Stats
- Real Time Play Stats
- Plus/Minus

Basketball Play Effectiveness

- Coaches Desired
  - Determine Effectiveness of Plays
  - Record All Plays with Result
  - Produce Report of Effectiveness
    - Each Play
    - # of Success / # of Attempts
- I Learned (During First Meeting)
  - Done After Game from DVR
  - Lots of Plays (~ 200) in Play Book
  - ~60-80 Plays Run Per Game
  - Plays Categorized
    - Early Offense 1,2 (E.g., Fast Breaks)
    - Offense 1,2 (E.g., Half Court Plays)
    - Special Situations 1,2 (E.g., Out of Bounds)
- Overwhelming

Basketball App Architecture

Basketball Play Effectiveness

- BPE Application
- Visual Basic
- Access
- Windows XP Desktop

Basketball already had all three of these components.

Risks

- Learning Basketball Processes?
- Programming in Visual Basic?
- Access?
- Building a GUI with Access/VB?
- Interfacing VB with Access?
- Generating Reports in Access?
- Etc...
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What I Learned From AV1

1. Wanted to Identify Plays Within a Possession
2. Plays Categorized Series / Set
   - Set is Variation on Series ("Parameterized Plays")
   - E.g.
     - Series:  Thumbs
     - Sets:  Up, Down, Circle
     - Plays:  Thumbs Up, Thumbs Down, Thumbs Circle
   - 1, 2 Notation
     - EO1 = Early Offense Series
     - EO2 = Early Offense Set
   - ST (Special Teams) Missing
   - Huge Impact On Design

What I Learned From AV2

1. Wanted to Grade Effectiveness of Plays
2. Wanted to Record Player Steals and Assists (Remember this...)
3. Needed to Navigate Plays and Possessions

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The Capstone Experience

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What I Learned From AV3

• Wanted Grades to Be A, B, C, D, F
• Wanted Results to Be X1, O1, X2, O2,…
• Wanted Results Associated With Players
• Wanted Series/Set Combined
• Wanted to Record Player Rebound
• Did NOT Want to Record Player Steals and Assists

What I Learned From Beta 1

• Entering a Play
  ▪ Some Things Calculated Automatically
    o Play/Possession Number
    o Score
  ▪ Most Things Entered Via Pull-Down Menus
    o Series / Set
    o Result
  ▪ But time Entered Manually (On Keyboard)
• Need Mouse-Only Input
• Need Easy Way to Adjust Clock
Player Timer

- For Each Player, Track
  - Minutes Played
    - Game Clock Time
    - Consecutive & Total
  - Minutes Rested
    - Wall Clock Time
    - Consecutive
- Must
  - Be Usable
    - On the Bench
    - In Real Time
  - Portable and Not Require Electrical Outlet
  - Feel Like a Pen and a Clipboard

Player Timer Prototypes

- Game Clock
  - Start / Stop
  - Counts Down
  - By Minutes/Seconds
- Access Interface
  - Write Number
  - Read Number
  - Add Up Numbers

Basketball App Architecture

Player Timer

- Player Time
  - Player Timer Application
    - Visual Basic
      - Access
        - Windows XP Tablet PC

Player Timer Development

- Knew Exactly What They Wanted, So...
- Designed “Final” Version
  - User Interface
  - Data Base Schema
  - Etc...
- Coded “Final” Version
- Lab Tested “Final” Version
  - At a Scrimmage
  - Totally Unusable
- Scrapped “Final” Version UI

Huge Mistake!

Software Updates

- Enable Clock Adjustments (While Clock Stopped)
- Enable Check In/Out By Touching
  - Check In/Out Button
  - Player Name
  - Player Slot
- Allow > 5 Players Checked In (While Clock Stopped)
- Enable Pending Check In (While Clock Running)
- Eliminate Almost All Modal Dialog Boxes
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Prototyping

Your Prototypes

• What?
• Why?
• How?
• When?
• Where?

What’s next?

• Team Project Plan Presentations
  • PowerPoint Template
  • Due Noon, Monday, January 31
    o All Teams, Word Document and PowerPoint Slide Deck
    o Email to Dr. D.
    o Read Submission Instructions in Template
  • Each Team Presents
    • Using a Team Laptop
    • At Most 15 Minutes (Rehearse Timing)
    • Single or Multiple Presenters (Your Choice)
  • Dress is business casual.
  • “Formal” Team Pictures Right After Meeting

BB Offense

Plus/Minus

Your Prototypes

• What?
• Why?
• How?
• When?
• Where?