The Capstone Experience

10/10: Prototyping

Prototyping

• Developed
  ▪ Early
  ▪ Rapidly
• Implement Subset of the Requirements
• Done for Variety of Reasons
• Are Not Finished Goods
• “Hacking” (Good Sense)

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 it will 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
Tradeoffs: Speed (to Write) vs...

- Speed vs Best Practices
  - Testing
  - Documentation
  - Security
  - Software Engineering
  - 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.)

Prototype: Case Studies

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

Basketball App Architecture

- Basketball Play Effectiveness
  - BPE Application
  - Visual Basic
  - Access
  - Windows XP Desktop

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
  - Can you relate?

Risks

- Learning Basketball Processes?
- Programming in Visual Basic?
- Access?
- Building a GUI with Access/VB?
- Interfacing VB with Access?
- Generating Reports in Access?
- Etc...
The Capstone Experience

Prototyping

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Prototyping

BB Stats AV1
Fields
• P# Play Number
• T Time
• C# Clip Number
• EO Early Offense
• O Offense
• SS Special Situations
• R Result

Nota Bene
• Just Screen Layout
• No Code (Underneath)
• Never Have All Entries Filled at Once

What I Learned From AV1

(1 of 2)

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

What I Learned From AV1

(2 of 2)

• Results Coded
  • XN Missed N Pointer (X1, X2, X3)
  • ONMade N Pointer (O1, O2, O3)
  • FF Foul on the Floor
  • TO Time Out
  • Etc...
• Wanted to Record Notes on Defense
• Didn’t Care About
  • Player Times
  • Video Clip Number

What I Learned From AV2

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

BB Stats AV2
Fields
• PO# Possession Number
• PL# Play Number
• SS Special Situations
• DF Defense

Nota Bene
• Just Screen Layout
• No Code (Underneath)
• Would NOT Have Entries in All Fields

Dr. Wayne Dyksen
Professor of Computer Science and Engineering

Michigan State University
East Lansing, Michigan 48824
**What I Learned From AV3**

- **Wanted...**
  - Grades to be A, B, C, D, F
  - Results to be X1, O1, X2, O2,...
  - Results associated with players
  - Series/Set combined
    - ("Thumbs Up" rather than "Thumbs", "Up")
  - To record player rebound
  - Video coordinator, GAs, and managers
    - Will use software
    - Very familiar with DVR controls
  - Did **NOT** want to record player steals or assists

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**What I Learned From Beta 1**

- **Entering a play**
  - Some things calculated automatically
    - Play/Possession number
    - Score
  - Most things entered with mouse via pull-down menus
    - Series/Set
    - Result
  - But time entered with keyboard via typing numbers
- **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

Basketball App Architecture

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

Player Timer Prototypes

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

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
- Field Tested “Final” Version
  - At a Scrimmage
  - Totally and Completely Unusable
- Scrapped “Final” Version UI and Start Over

Software Updates

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

- What?
- Why?
- How?
- When?
- Where?

What's ahead? (1 of 2)

- Creating and Giving Presentations
- Design Day Booklet Team Page Content
  - Read instructions over and over.
  - Your Tasks
    - Write project description.
    - Edit Carefully
    - Create, Insert and provide artwork.
    - Screen Capture, Screen Mockup, etc.
    - 2 or 3 PNG Images, 1 Uniform PNG per Artwork
    - Framed into Team Page and High Resolution Original
    - Provide Professional Quality
    - Check everything else, highlighting changes in yellow.
  - Due by Midnight, Thursday, October 13.
- Zip Folder team-<team-name>-design-day-booklet-page.doc
  - team-<team-name>-artwork-1.png
  - [team-<team-name>-artwork-1.png]