



09/21: Prototyping

CSE 498, Collaborative Design



Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2009

S Prototypes

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

2

S Why? Answer Questions

Help Determine

- Specifications
 - Functional
 - Design
 - Technical
- Usability
- How Existing Code Works
- Programming Language(s)
- Development Environment(s)
- Operating Environment(s)
- Etc...

3

S Why? Determine Schedule

Determine how long will it take to...

- Install/learn the development environment.
- Install/learn the existing code.
- Convert the existing code.
- Convert the existing database.
- Get libraries working.
- Deploy the application.
- Etc....

4

S 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...

5

S 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 Question(s) Answered

6

S 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

7

S Challenge/Danger

- "Hack" Solution
 - It works.
 - It's *a* way to do something.
- vs
- "Correct" Solution
 - It works.
 - It's the "right" way to do something.
(There may be more than one "right" way to do something.)

Often My Biggest Frustration.

8

S Prototypes: Case Studies

- Basketball
- Play Effectiveness
 - Player Timer
 - Radio Stats
 - Real Time Play Stats

9

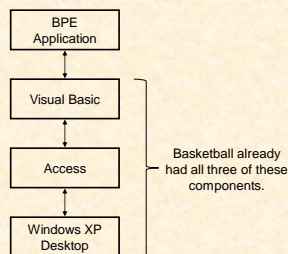
S Basketball Play Effectiveness

- 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

10

S Basketball App Architecture

Basketball Play Effectiveness



11

S Risks

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

12

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")
 - 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 AV1 (2 of 2)...

- Results Coded
 - XN Missed N Pointer (X1, X2, X3)
 - ON Made 1 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

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

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 AV3

Fields

- PE#
- Time
- PL#
- MSU
- Op
- Effectiveness
- P Player
- S A

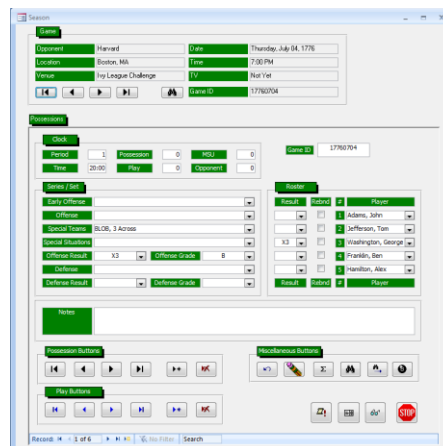
Commands

- Next Play
- Next Possession
- Previous Play
- Previous Possession
- Delete Play
- Delete Possession
- Exit

S 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 😊

19



BB Stats Beta 1

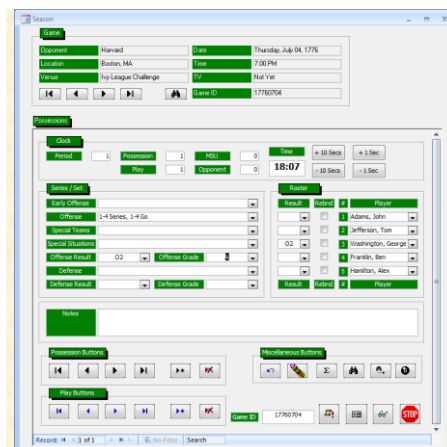
(First Version With Code)

20

S What I Learned From Beta 1...

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

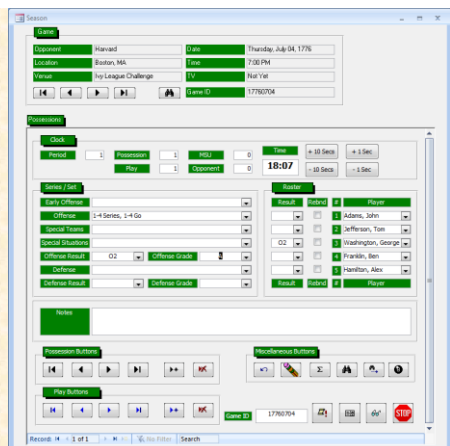
21



BB Stats Beta 2

(Still Not Much Implemented)

22



BB Stats V1.0

23

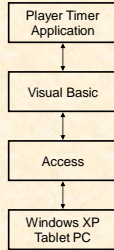
S Player Timer

- 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

24

S Basketball App Architecture

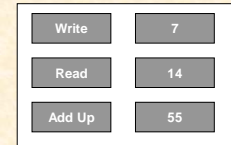
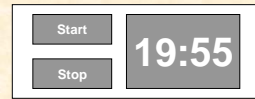
Player Time



25

S Player Timer Prototypes

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



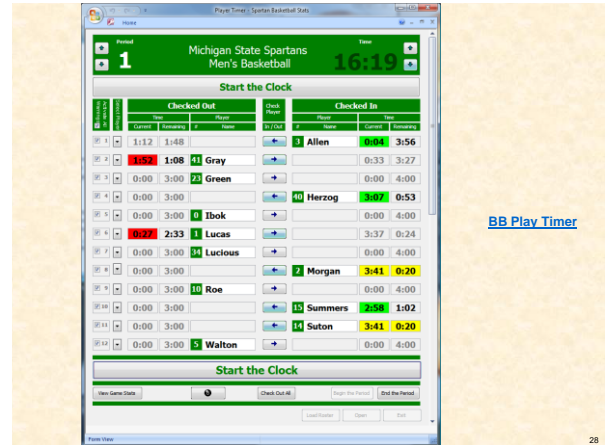
26

S Player Timer Huge Mistake

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 Unusable
- Scrapped "Final" Version

27



28

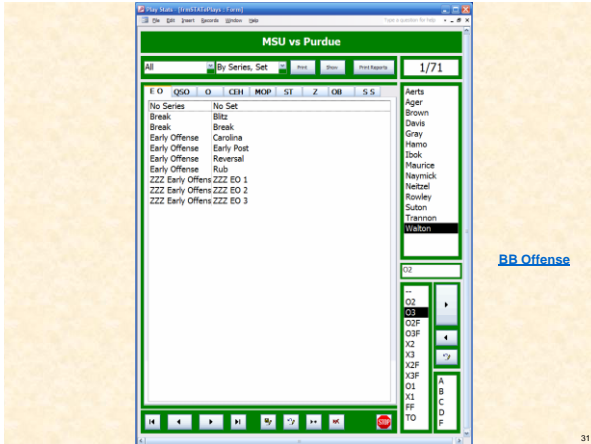
S Software Updates

- 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

29



30



S Your Prototypes

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

32

S What's next?

- Resume Writing & Interviewing
- Project Plan Presentations
 - 9/28, 9/30, 10/5
 - [Template On Web](#)
 - Schedule Announced on Sunday, 9/27 (If Conflicts, Say So Now)
 - Everybody Turns in PowerPoint and Document By 3:00pm on Monday, 9/28
 - Dress is business casual.
 - “Formal” Team Pictures Right After Meeting
- [Career Gallery](#), 10/07

33