

01/14: Risks and Prototypes

The Capstone Experience

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Spring 2020



*From Students...
...to Professionals*

Risks and Prototypes

➤ Risks

- Prototypes

Identifying Risks

- What You Don't
 - Know
 - Understand
 - Know How to Do
- Normally
 - Major Project Features
 - “Showstoppers”
- Varies From
 - Not Familiar With But (Probably) Can Learn to
 - Absolutely No Idea How to Do It

What are you worried about?

What should you be worried about?



Example Risks

Including but not limited to...

- Business Processes
- Key Application Features
- Hardware Systems
- Software Systems
- Development / Programming Environments
- Programming Languages
- Etc...

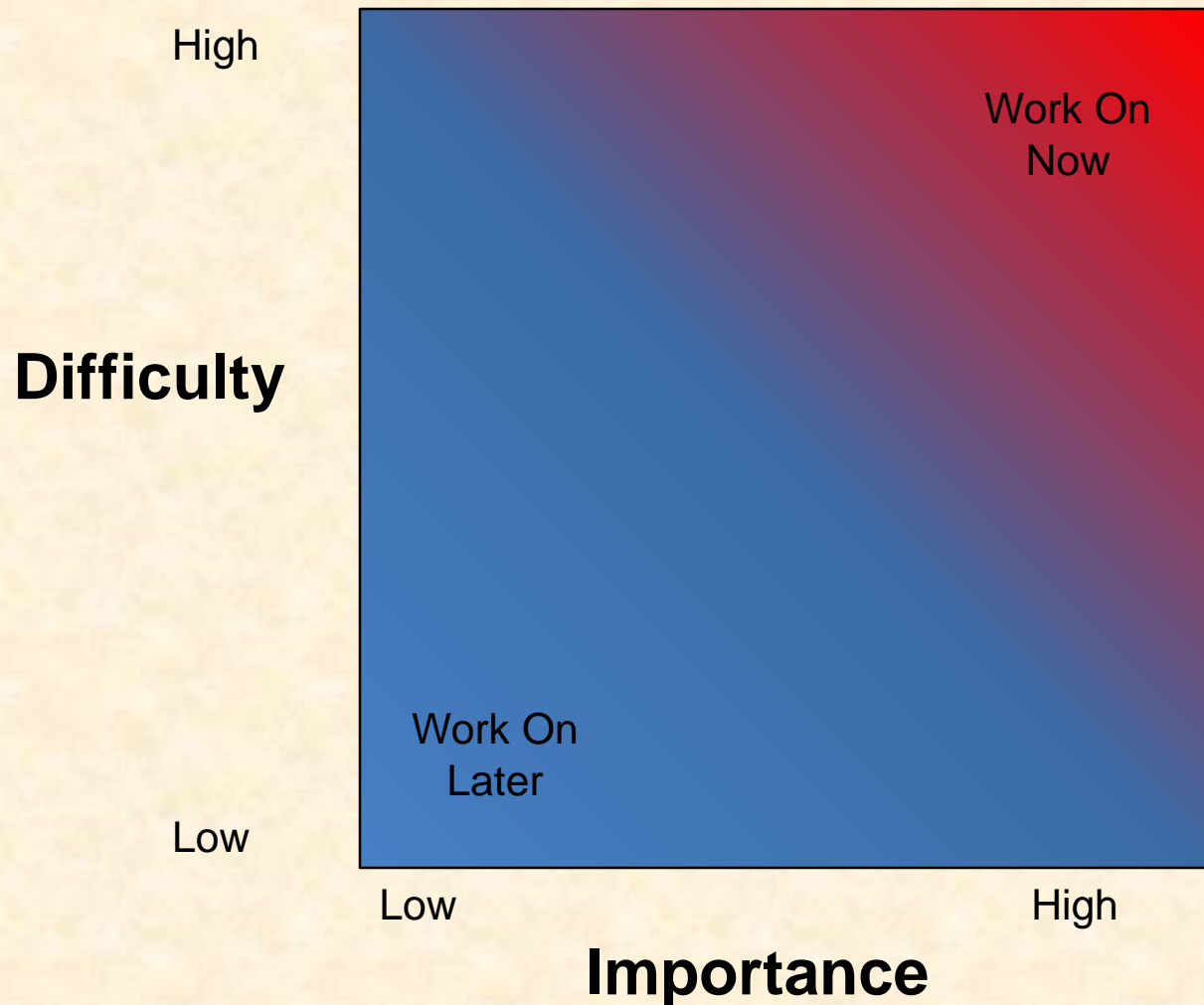


Prioritizing Risks

- Classify Difficulty
 - High Very Hard, No Idea How to Do
 - Medium
 - Low Not Hard, Probably Doable
- Classify Importance
 - High Showstopper, Must Have
 - Medium
 - Low Not Vital, Nice to Have



Prioritizing Risks

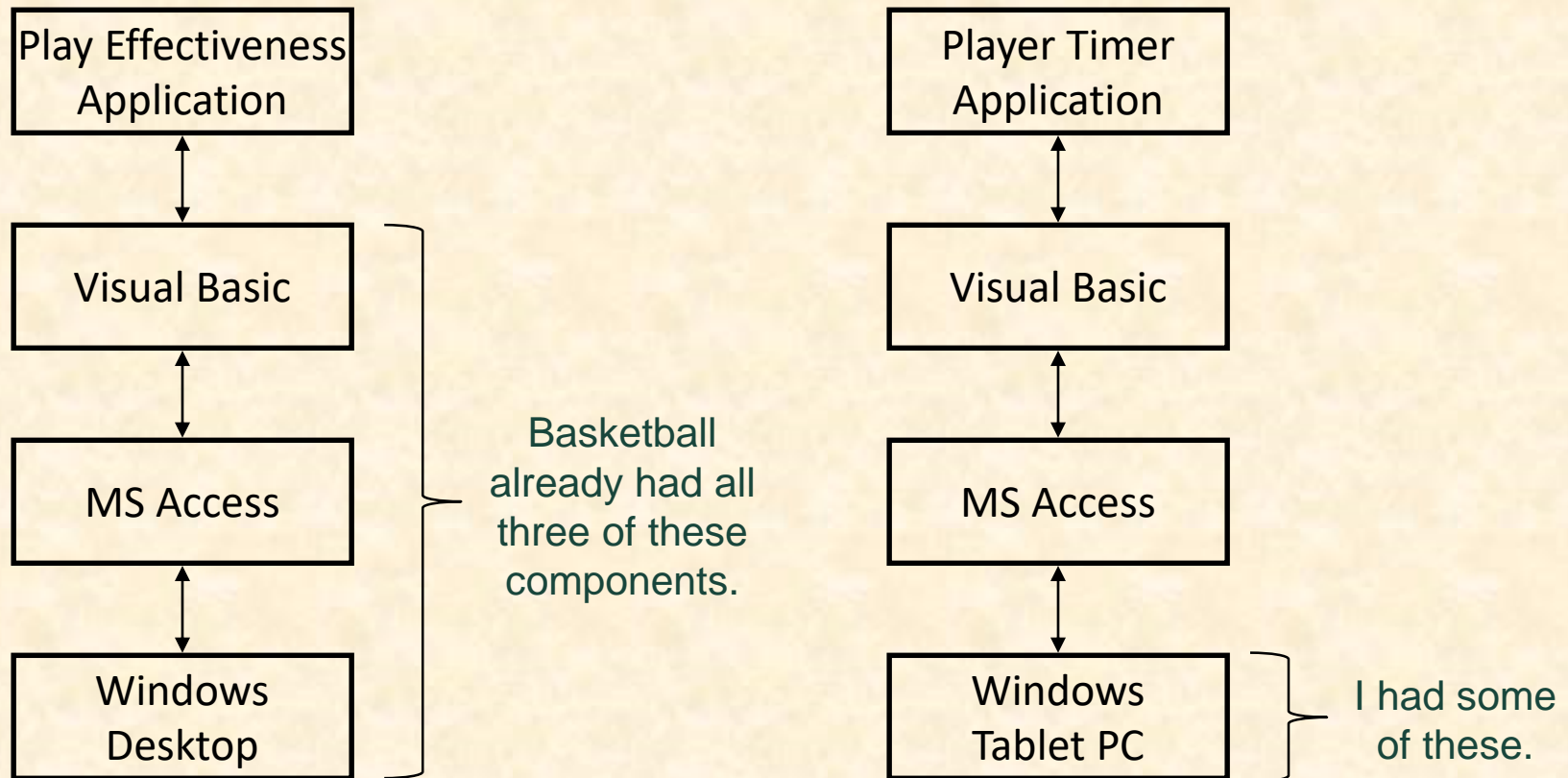


Case Studies: Basketball Apps

- Play Effectiveness
 - Determine Effectiveness of Plays
 - Record All Plays with Results
 - Produce Reports of Effectiveness
- Player Timer
 - Keep Track of Player Times
 - Record Minutes Played and Rested
 - Use On the Bench, During the Game



Basketball Apps Architectures



Basketball Apps Risks

- What SDK should I use?
- Can I write this in Visual Basic?
- How do I make a GUI in VB?
- How do I interface VB with Access?
 - Create/Open/Save a Database?
 - Read/Write Records?
 - Traverse Records?
- How do I implement clocks in Windows?
 - Game Clock?
 - Wall Clock?
- How do I generate a report from Access?



Mitigating Risks

- Use Existing Resources

- Including But Not Limited To

- Faculty
 - Other Students
 - Product Demos
 - Book Sample Code
 - Downloadable Examples
 - Wizards
 - Etc...

Nota Bene:

1. Check license if including in project.
2. Document.
3. Inform client.

- Test Drive

- Install
 - Compile
 - Extend
 - Etc...

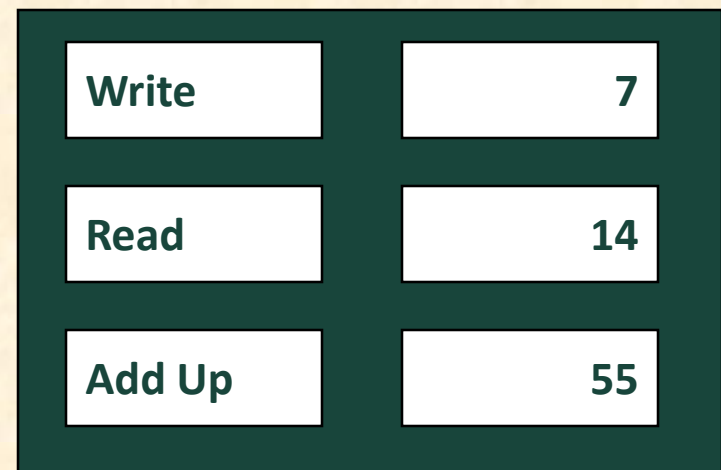
- Build Prototypes

- Single Purpose
 - Quick-and-Dirty



Basketball Apps Risk Mitigation

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



Risks and Prototypes

✓ Risks

➤ Prototypes



Prototypes

- 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
- 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 onto an iOS device.
- ...Etc....



Why? Identify Risks

- 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-Ability...



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, May Not Be Appropriate in Final Deliverable



Challenge/Danger

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

vs

Often My Biggest
Frustration

- “Correct” Solution
 - It works.
 - It’s the ***“right”*** way to do something.
(There may be more than one “right” way to do something.)



Basketball Prototypes Case Studies

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



Play Effectiveness App

- Functional Specifications
 - Determine Effectiveness of Plays
 - Record All Plays with Results
 - Produce Reports of Effectiveness
 - Each Play
 - # of Successes / # of Attempts
- Design Specifications?
- Technical Specifications?



Initial Meeting with Video Coordinator

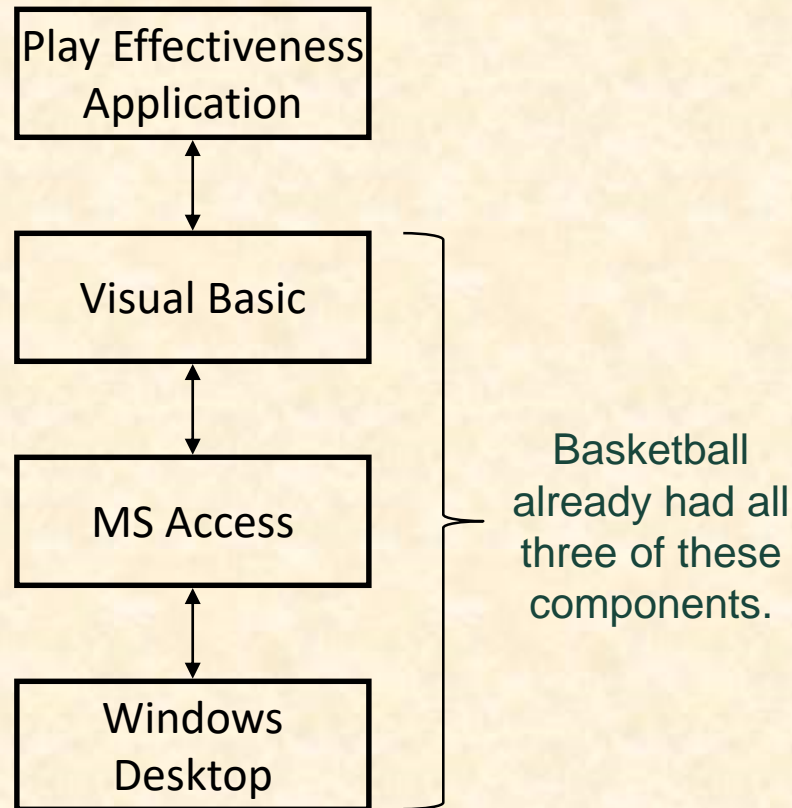
I Learned...

- Done After Game
 - On Desktop Computer
 - From DVR-Like App
- Lots of Plays (~ 200) in Play Book
- ~20-40 Plays Run Per Game
- Plays Categorized
 - Early Offense 1,2 (i.e., Fast Breaks)
 - Offense 1,2 (i.e., Half Court Plays)
 - Special Situations 1,2 (i.e., Out of Bounds)
- Overwhelming ← Can you relate?

The
Business
Processes



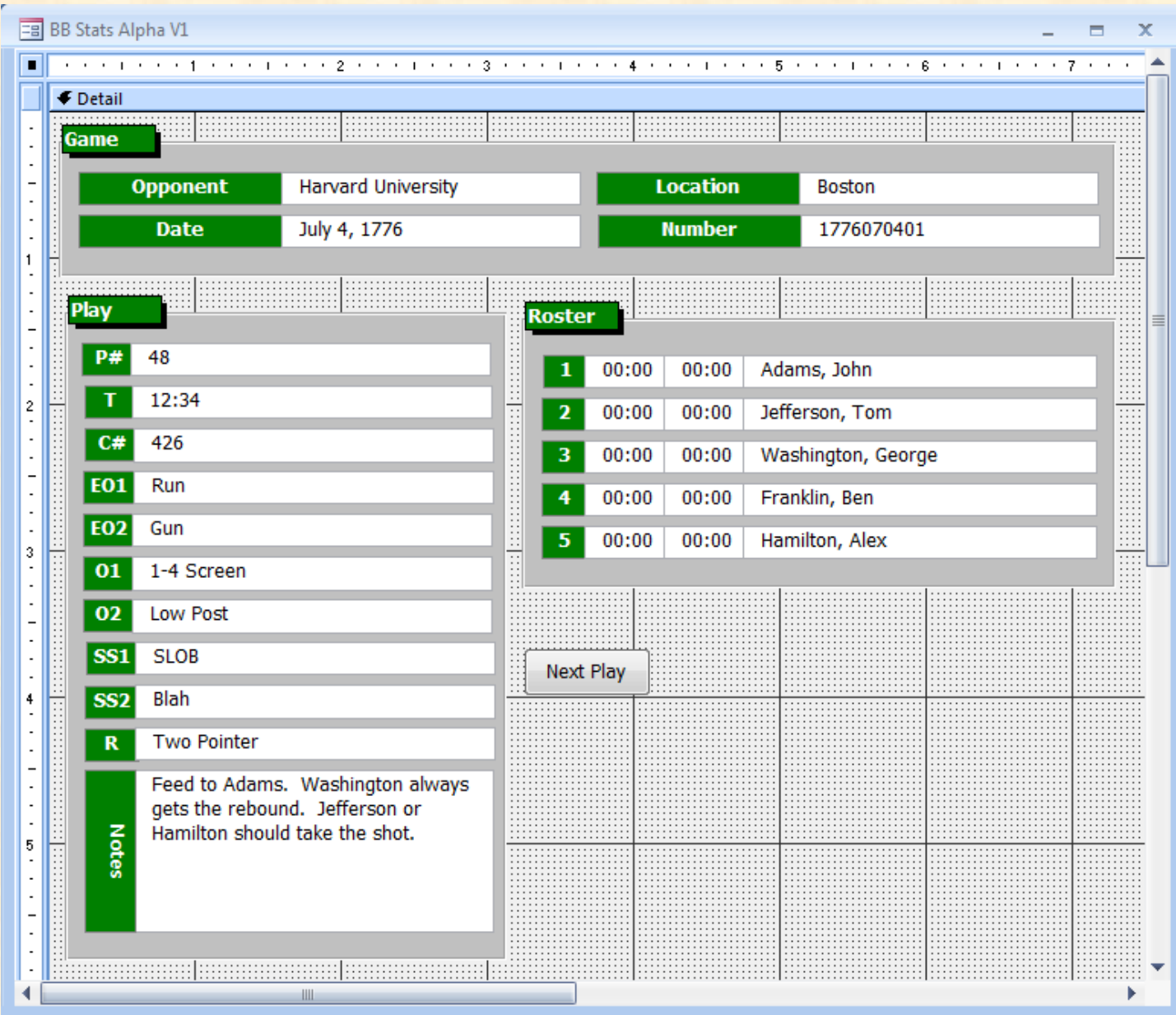
Play Effectiveness Architecture



Risks

- Learning Basketball Business Processes
- Programming in Visual Basic
 - Can this be done in VB?
 - ! Can I learn VB?
- Making a GUI in VB
- Interfacing VB with Access
 - Creating/Opening/Saving a Database
 - Reading/Writing Records
 - Traversing Records
- Generating Reports in Access
- Etc...





BB PE PV1

(Prototype Version 1)

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 PV1

[1 of 2]

- Wanted to Identify Plays Within a Possession
- 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 PV1

[2 of 2]

- Results Coded
 - *XN* Missed *N* Pointer (X1, X2, X3)
 - *ON* Made *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 (C#)



BB Stats Alpha V1

Detail

Game

Opponent	Harvard University	Location	Boston
Date	July 4, 1776	Number	1776070401

Play

P#	48
T	12:34
C#	426
EO1	Run
EO2	Gun
O1	1-4 Screen
O2	Low Post
SS1	SLOB
SS2	Blah
R	Two Pointer
Notes	Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.

Roster

1	00:00	00:00	Adams, John
2	00:00	00:00	Jefferson, Tom
3	00:00	00:00	Washington, George
4	00:00	00:00	Franklin, Ben
5	00:00	00:00	Hamilton, Alex

Next Play

So, from this to...

BB PE PV1

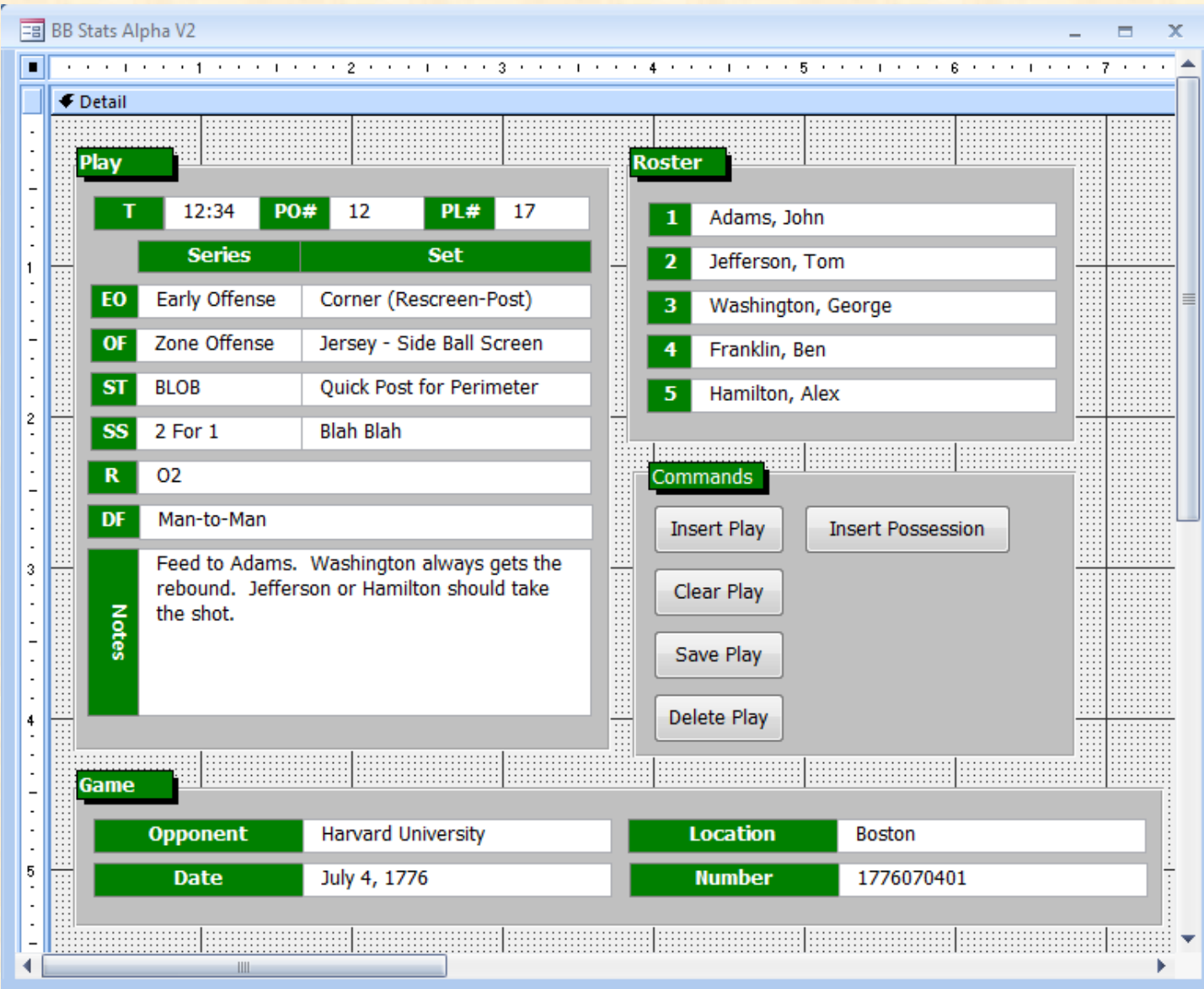
Fields

- 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





BB PE PV2

Fields

- PO#
Possession Number
- PL#
Play Number
- SS
Special Situations
- DF
Defense

Nota Bene

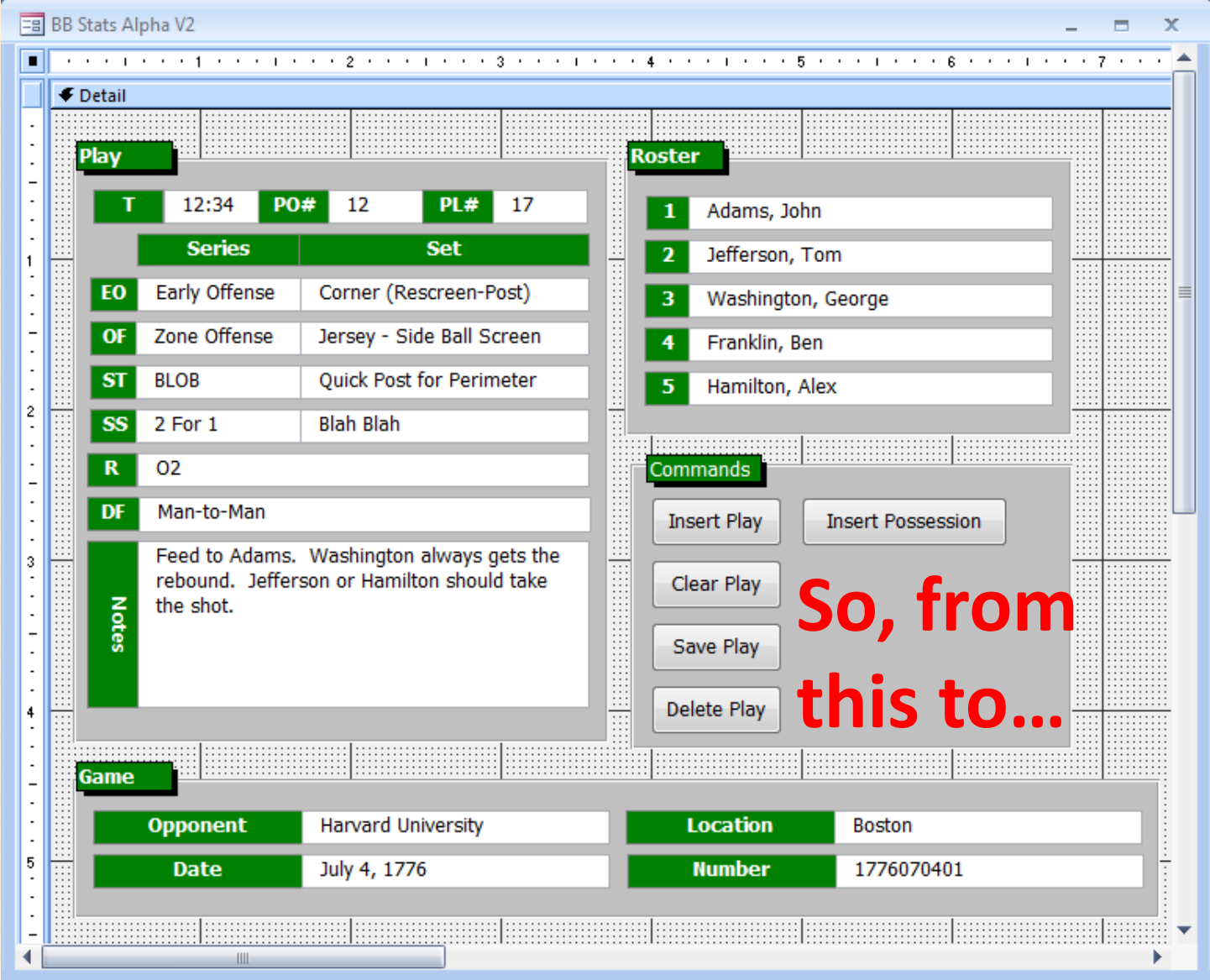
- Just Screen Layout
- No Code (Underneath)
- Would **NOT** Have Entries in All Fields



What I Learned From PV2

- Wanted to Grade Effectiveness of Plays
- Wanted to Record Player Steals and Assists (Remember this...)
- Needed to Navigate Plays and Possessions
- Wanted to See Running Total Score





BB PE PV2

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



Detail

Play

PE#	2	Time	12:34	PL#	17	MSU	37	Op	23
Series			Set			Effectiveness			
EO	Early Offense			Corner (Rescreen-Post)			Great		
ST	BLOB			Quick Post for Perimeter			Poor		
OF	Zone Offense			Jersey - Side Ball Screen			So-So		
R	X			O			Outstanding		
DF	Man-to-Man			Something Else			Good		
SS	2 For 1			Blah Blah			Unreal		

Roster

P	Player	S	A
1	Unbound	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Jefferson, Tom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Washington, George	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Franklin, Ben	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Hamilton, Alex	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Commands

Next Play Next Possession

Previous Play Previous Possession

Delete Play Delete Possion

Exit

Notes Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.

Game

Opponent	Harvard University	Location	Boston
Date	11/17/2003	Number	1776070401



What I Learned From PV3

- Wanted...
 - Grades to Be A, B, C, D, F
 - Results Associated With Players
 - Series/Set Combined
(“Thumbs Up” Rather Than “Thumbs”, “Up”)
 - To Record Player Rebound
- Will be used by...
 - Video Coordinator, GAs, and Managers
 - Very Comfortable with DVR Controls
- Did NOT Want to Record Player Steals or Assists



Detail

Play

PE#	2	Time	12:34	PL#	17	MSU	37	Op	23
	Series		Set		Effectiveness				
EO	Early Offense		Corner (Rescreen-Post)		Great				
ST	BLOB		Quick Post for Perimeter		Poor				
OF	Zone Offense		Jersey - Side Ball Screen		So-So				
R	X		O		Outstanding				
DF	Man-to-Man		Something Else		Good				
SS	2 For 1		Blah Blah		Unreal				

Roster

P	Player	S	A
1	Unbound	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Jefferson, Tom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Washington, George	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Franklin, Ben	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Hamilton, Alex	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Commands

Next Play Next Possession

Previous Play Previous Possession

Delete Play Delete Possion

Exit

Notes

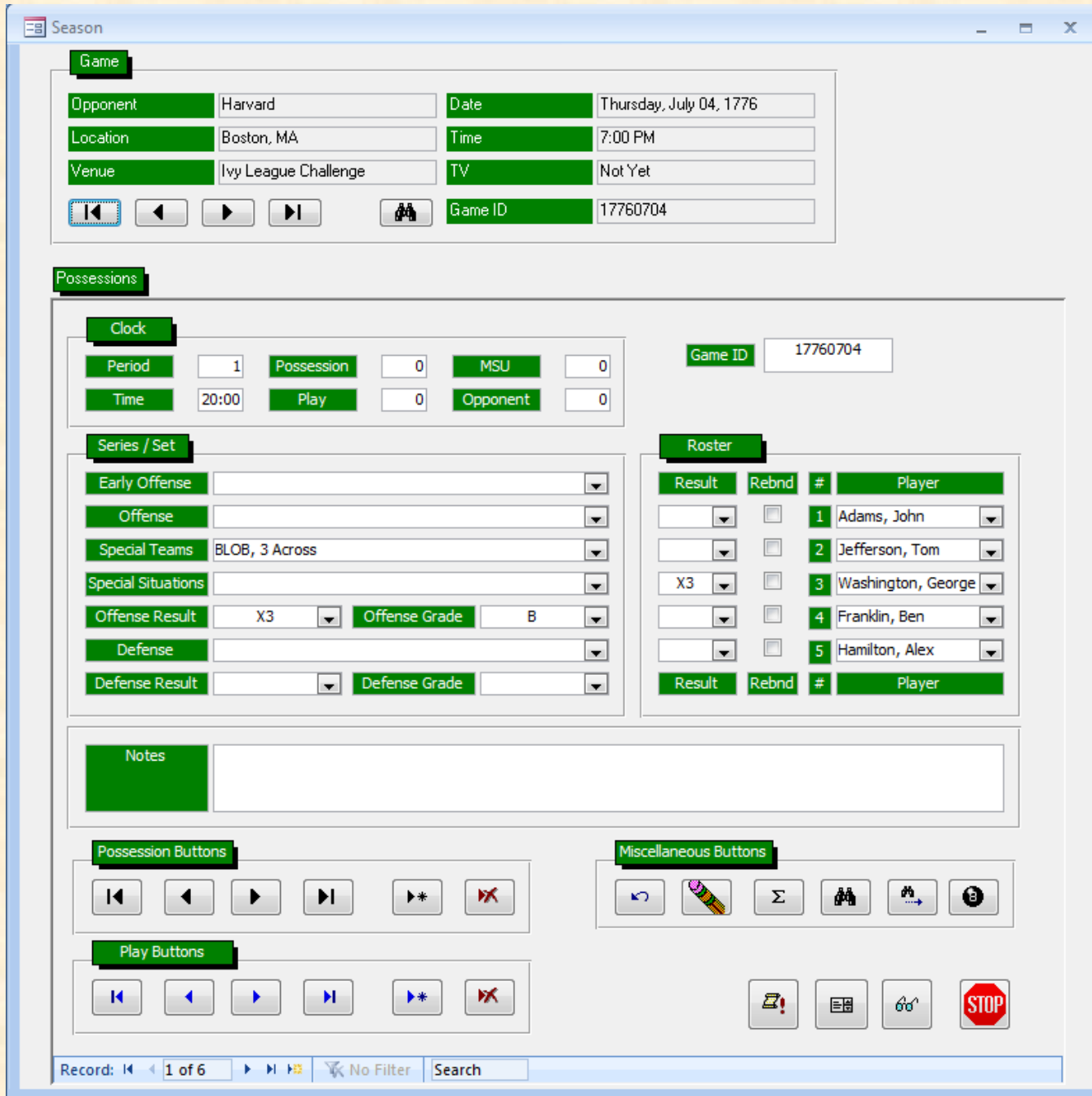
Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.

So, from this to...

Game

Opponent	Harvard University	Location	Boston
Date	11/17/2003	Number	1776070401





BB PE AV1

(Alpha Version 1)

First Version
With Code

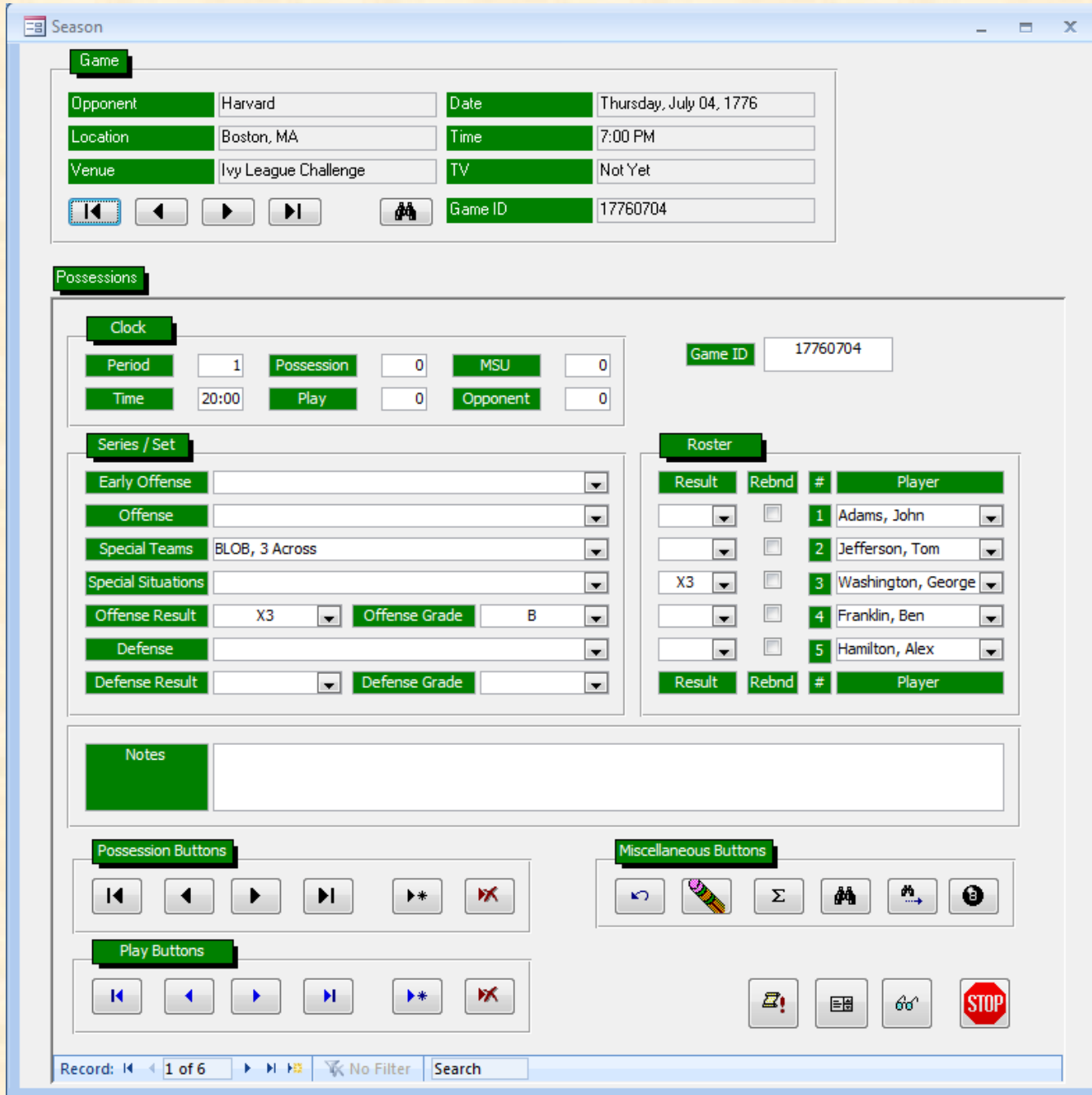
Not Much
Implemented



What I Learned From Alpha 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
 - Easy Way to Adjust Clock





BB PE AV1

(Alpha Version 1)

First Version
With Code

Not Much
Implemented

So, from
this to...



Season

Game

Opponent: Harvard Date: Thursday, July 04, 1776
 Location: Boston, MA Time: 7:00 PM
 Venue: Ivy League Challenge TV: Not Yet
 Game ID: 17760704

Possessions

Clock
 Period: 1 Possession: 1 MSU: 0 Opponent: 0
 Play: 1 Time: 18:07
 +10 Secs +1 Sec
 -10 Secs -1 Sec

Series / Set
 Early Offense: [Dropdown]
 Offense: 1-4 Series, 1-4 Go [Dropdown]
 Special Teams: [Dropdown]
 Special Situations: [Dropdown]
 Offense Result: O2 [Dropdown] Offense Grade: [Dropdown]
 Defense: [Dropdown]
 Defense Result: [Dropdown] Defense Grade: [Dropdown]

Roster

Result	Rebnd	#	Player
[Dropdown]	<input type="checkbox"/>	1	Adams, John [Dropdown]
[Dropdown]	<input type="checkbox"/>	2	Jefferson, Tom [Dropdown]
O2 [Dropdown]	<input type="checkbox"/>	3	Washington, George [Dropdown]
[Dropdown]	<input type="checkbox"/>	4	Franklin, Ben [Dropdown]
[Dropdown]	<input type="checkbox"/>	5	Hamilton, Alex [Dropdown]

Notes

Possession Buttons
 [Back] [Left] [Right] [Next] [Play] [Stop]

Miscellaneous Buttons
 [Undo] [Eraser] [Sum] [Binoculars] [Map] [Info]

Play Buttons
 [Back] [Left] [Right] [Next] [Play] [Stop]

Game ID: 17760704 [Warning] [List] [Go] [STOP]

Record: 1 of 1 [Filter] No Filter Search

BB PE AV2
 Still Not Much
 Implemented



Season

Game

Opponent: Harvard Date: Thursday, July 04, 1776
 Location: Boston, MA Time: 7:00 PM
 Venue: Ivy League Challenge TV: Not Yet
 Game ID: 17760704

Possessions

Clock
 Period: 1 Possession: 1 MSU: 0 Opponent: 0
 Play: 1 Time: 18:07
 +10 Secs +1 Sec
 -10 Secs -1 Sec

Series / Set
 Early Offense: [Dropdown]
 Offense: 1-4 Series, 1-4 Go
 Special Teams: [Dropdown]
 Special Situations: [Dropdown]
 Offense Result: O2 Offense Grade: [Dropdown]
 Defense: [Dropdown]
 Defense Result: [Dropdown] Defense Grade: [Dropdown]

Roster

Result	Rebnd	#	Player
[Dropdown]	<input type="checkbox"/>	1	Adams, John
[Dropdown]	<input type="checkbox"/>	2	Jefferson, Tom
O2	<input type="checkbox"/>	3	Washington, George
[Dropdown]	<input type="checkbox"/>	4	Franklin, Ben
[Dropdown]	<input type="checkbox"/>	5	Hamilton, Alex

Notes

Possession Buttons
 [Back] [Left] [Right] [Next] [Play] [Stop]

Miscellaneous Buttons
 [Undo] [Eraser] [Sum] [Binoculars] [Map] [Info]

Play Buttons
 [Back] [Left] [Right] [Next] [Play] [Stop]

Game ID: 17760704 [Warning] [List] [Go] [STOP]

Record: 1 of 1 [Filter] No Filter Search

BB PE BV1

(Beta Version 1)



Basketball Prototypes Case Studies

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

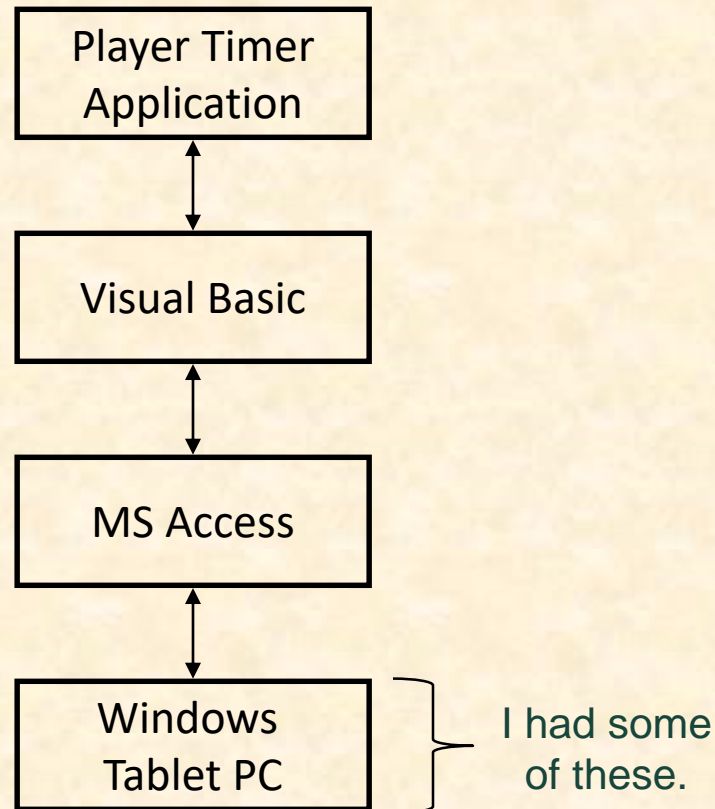


Player Timer App

- Keep Track of Player Times
- For Each Player Record
 - Minutes Played
 - Game Clock Time
 - Consecutive & Total
 - Minutes Rested
 - Wall Clock Time
 - Consecutive
- Must
 - Be Usable on the Bench, During the Game
 - Be Portable and Not Require Electrical Outlet
 - Feel Like a Pen and a Clipboard



Player Timer App



Risks

- Learning Basketball Processes
- Implementing Clocks in Windows?
 - Game Clock
 - Wall Clock
- Very Limited Screen Real Estate
(Different Problem Than Mobile App)
- Computing and Displaying Cumulative Times
- Hidden Risk (“Danger Will Robinson!”)



Player Timer Development

- Knew Exactly What They Wanted, So...
 - Designed “Final” Version
 - User Interface
 - Data Base Schema
 - Etc...
 - Coded “Final” Version
 - Bench Tested “Final” Version
 - Field Tested “Final” Version
 - In Practice Scrimmage
 - Totally and Completely Unusable
 - Scrapped “Final” Version UI and Started Over
- Huge Mistake!



Player Timer - Spartan Basketball Stats

Home

Period **1** Michigan State Spartans Men's Basketball Time **16:19**

Start the Clock

Activate All Warnings	Select Player	Checked Out				Check Player In / Out	Checked In			
		Time		Player			Player		Time	
		Current	Remaining	#	Name		#	Name	Current	Remaining
<input checked="" type="checkbox"/>	1	1:12	1:48			←	3	Allen	0:04	3:56
<input checked="" type="checkbox"/>	2	1:52	1:08	41	Gray	→			0:33	3:27
<input checked="" type="checkbox"/>	3	0:00	3:00	23	Green	→			0:00	4:00
<input checked="" type="checkbox"/>	4	0:00	3:00			←	40	Herzog	3:07	0:53
<input checked="" type="checkbox"/>	5	0:00	3:00	0	Ibok	→			0:00	4:00
<input checked="" type="checkbox"/>	6	0:27	2:33	1	Lucas	→			3:37	0:24
<input checked="" type="checkbox"/>	7	0:00	3:00	34	Lucious	→			0:00	4:00
<input checked="" type="checkbox"/>	8	0:00	3:00			←	2	Morgan	3:41	0:20
<input checked="" type="checkbox"/>	9	0:00	3:00	10	Roe	→			0:00	4:00
<input checked="" type="checkbox"/>	10	0:00	3:00			←	15	Summers	2:58	1:02
<input checked="" type="checkbox"/>	11	0:00	3:00			←	14	Suton	3:41	0:20
<input checked="" type="checkbox"/>	12	0:00	3:00	5	Walton	→			0:00	4:00

Start the Clock

View Game Stats Check Out All Begin the Period End the Period

Load Roster Open Exit

Form View

Player Timer

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 All Modal Dialog Boxes



Basketball Prototypes Case Studies

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



Risks and Prototypes

✓ Risk

✓ Prototypes



01/14: Announcements

- Apple Developer License
 - Request Invitation from James or Ryan
 - Team Members are Members
 - James and Ryan are Admins
- PowerPoint Slide Deck Submission Instructions
 - Read Carefully
 - File Name Conventions
 - All Lower Case
 - Replace Blanks with Dashes
 - Examples
 - ❖ “Spectrum Health” → “spectrum-health”
 - ❖ “team-[team-name]-status-report.pptx” → “team-spectrum-health-team-status-report.pptx”
 - Submit to Dr. D. and your client by the deadline.
 - ! (Submitted Correctly) → !(Processed Correctly)
- Scheduling Client Conference Calls
 - Use Google Calendar
 - Respect Other Appointments
- Absences
 - From Meetings and From “Working”
 - Inform TA
 - Excused Illness Absence Requires Document
 - Signed by a Medical Doctor
 - Stating You Are Too Sick to Attend Class
- Does anyone need equipment? See James and Ryan.



What's ahead?

[1 of 3]

- Team Photos

- Friday, January 17, 9:00 a.m. – 1:00 p.m.
- Dress code is business casual.
- TAs have made schedule.

- Setup

- Team Machines

- Dell Server If Needed (Ask TAs)
- Apple iMacs (with Windows 10 VM)

- Team Software

- Microsoft Office
 - ❖ Word and PowerPoint
 - ❖ Microsoft Windows Version ← Required. Use Windows 10 VM.
- Web Server
- Code Repository
- SDK's
- Etc.



What's ahead?

[2 of 3]

- All-Hands Meetings
 - ~~01/07: Capstone Overview~~
 - ~~01/09: Project Plan~~
 - ~~01/14: Risks and Prototypes~~
 - 01/16: Team Status Report Presentations
 - 01/21: Schedule and Teamwork
 - 01/23: Team Status Report Presentations
 - 01/28: Team Project Plan Presentations
 - 01/30: Team Project Plan Presentations
 - 02/04: Team Project Plan Presentations
 - 02/06: Team Project Plan Presentations



What's ahead?

[3 of 3]

- Team Status Report Presentations
 - [PowerPoint Template](#)
 - Due 11:59 p.m., Wednesday, January 15 ← **Due Tomorrow**
 - Email to Dr. D.
 - Subject: Team [Team Name]: Status Report Presentation
Subject: Team Auto-Owners: Status Report Presentation
 - Attachment: team-[team-name]-status-report-presentation.pptx
Attachment: team-urban-science-status-report-presentation.pptx
- Dr. D. Will Combine Into Single PowerPoint
 - To Speed Things Up During Meeting
 - Do NOT Modify Master Slide
 - Must Use Windows Version of Microsoft Office
- Each Team Presents
 - Using TA's Laptop
 - At Most 4.5 Minutes (Rehearse Timing)
 - Single or Multiple Presenters (Your Choice)
- Split All-Hands Meetings
 - Ryan's Teams, Anthony 1297
 - James' Teams, Anthony 1300



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Team [Team Name]

The Capstone Experience

Dr. Wayne Dyksen

Department of Computer Science and Engineering

Michigan State University

Spring 2020



*From Students...
...to Professionals*

Status Report Instructions

- Use the Microsoft Windows version of PowerPoint.
- Required Template
 - Do not edit the master slides.
 - Do not change the organization or number of slides.
 - Make your presentation fit within these four slides.
- Content
 - For the slide titles, replace [Team Name] with your company name as in “Team Auto-Owners” and [Project Title] by the project title posted online.
 - All presentations will be posted on the course web site so do not include company confidential information or anything that your client would not want posted.
 - Delete this slide from the presentation.
- Presenting
 - The order of the presentations during our meeting will be team numerical order.
 - The time limit for your presentation is 4.5 minutes, which will be strictly enforced. Practice your presentation to ensure that you will finish within the allotted time.
- Submission by Email ← **Read this carefully.**
 - All presentations are due via email to me and to your client by 11:59 p.m., Wednesday, January 15. Send your presentation to your client in a separate email; do not cc me.
 - For subject, use “Team [Team Name]: Status Report Presentation” as in “Team Urban Science: Status Report Presentation”.
 - Attach the PowerPoint source file named “team-[team-name]-status-report-presentation.pptx” as in team-auto-owners-status-report-presentation.pptx. Use all lower case and replace blanks by dashes in your filename.
 - Include some (professional) text in the body to avoid being sent to my junk folder and to practice being a professional.



Team [Team Name]

Status Report

[1 of 4]

[Project Title]

- Project Overview

- Description Point 1
- Description Point 2
- Description Point 3
- Description Point 4

Status Information:

Think clicking “Status” on an Amazon order.

- You bought this on January 7. Helpful?
- We’re going to send this to you. Satisfied?
- People who bought this also bought.... We good?

Where the \$*(%(\$* is my order?

Delete this textbox.

- Project Plan Document

- Status Point 1
- Status Point 2
- Status Point 3
- Status Point 4

Include status information.

What’s the status of your project plan document?

Have you started it?

How much have you written?

What percentage complete is it?

Delete this textbox and the brace to the left.



Team [Team Name]

Status Report

[2 of 4]

[Project Title]

- Server Systems / Software
 - Description & Status Point 1
 - Description & Status Point 2
 - Description & Status Point 3
- Development Systems / Software
 - Description & Status Point 1
 - Description & Status Point 2
 - Description & Status Point 3

Include status information.
Are all systems up and running?
Have you tested everything?
**Delete this textbox and the
brace to the left.**



Team [Team Name]

Status Report

[3 of 4]

[Project Title]

- Client Contact

- Status Point 1
- Status Point 2

- Team Meetings

- Status Point 1
- Status Point 2

- Team Organization

- Description Point 1
- Description Point 2

Include status information.

Have you talked with/met with your client?

Have you scheduled a weekly conference call? When?

Have you scheduled an in-person meeting? When?

How many times has your team met so far?

Have you scheduled team meetings? How often?

Delete this textbox and the brace to the left.



Team [Team Name]

Status Report

[4 of 4]

[Project Title]

Risks

- Risk 1
 - Description
 - Mitigation
- Risk 2
 - Description
 - Mitigation
- Risk 3
 - Description
 - Mitigation
- Risk 4
 - Description
 - Mitigation

List only “real” risks. For example, learning a new computer languages is **not** a risk.

Give “useful” explanation of how you are going to mitigate each risk. For example, “we will learn how to do it” is **not** a useful explanation.

Delete this textbox.

