MICHIGAN STATE UNIVERSITY

09/13: Risks and Prototypes

The Capstone Experience

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Fall 2021

From Students…
…to Professionals

Meeting Attendance Notes

- Microsoft Teams
  - Joined $\leq$ 10:20:00 AM $\Longrightarrow$ On Time
  - 10:20:01 AM $\leq$ Joined $\leq$ 10:25:00 AM $\Longrightarrow$ Late
  - 10:25:01 AM $\leq$ Joined $\Longrightarrow$ Absent
  - Left $<$ Meeting End Time $\Longrightarrow$ Absent
- Google Form
  - Random Times During Meeting
  - Once At End of Meeting
  - Miss Google Form $\Longrightarrow$ Absent
- Meeting End Time
  - Normally $\leq$ 11:40:00 AM
  - Not Until "Dismissed"
  - Dr. D./Instructors May Dismiss Folks and Stay for Questions
- Grade Impact
  - On Time $\Longrightarrow$ -0.0
  - Late $\Longrightarrow$ -0.5
  - Absent $\Longrightarrow$ -1.0

Google Form Attendance Check

↑↑↑↑↑↑↑↑

Only An Example

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

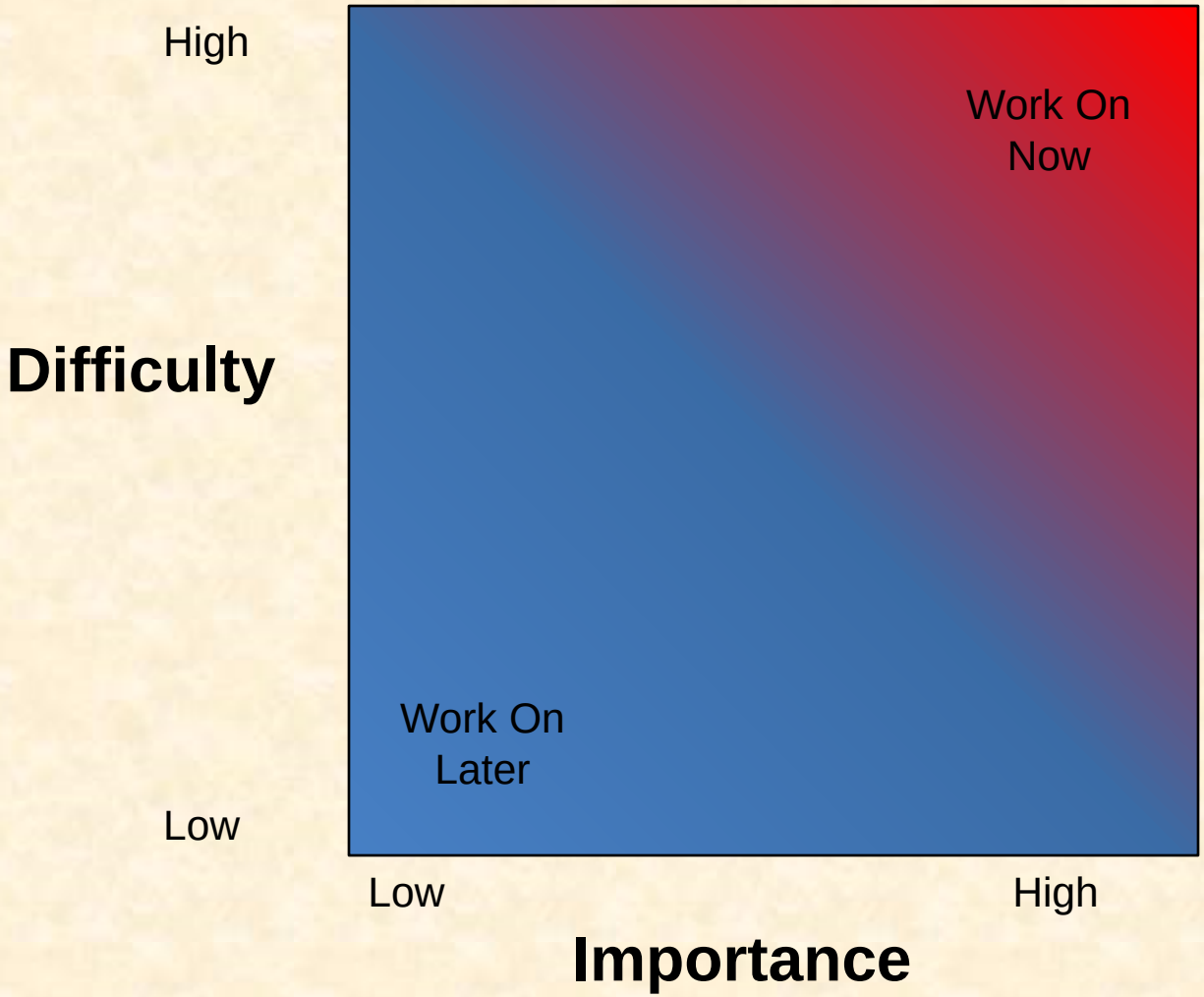
Including but not limited to...

- 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

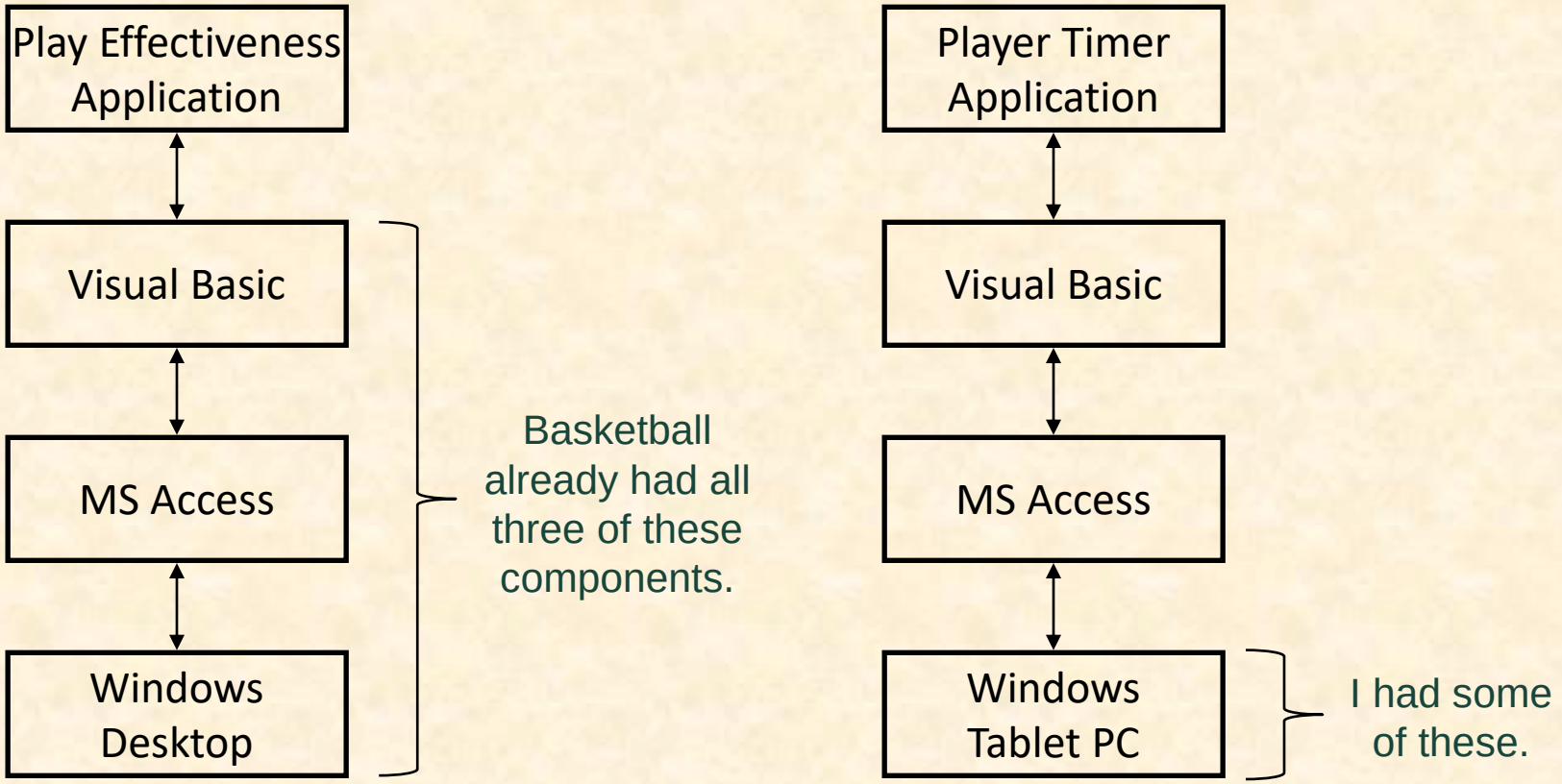
Prioritizing Risks



Case Studies: MSU Men's 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...
  - Test Drive
    - Install
    - Compile
    - Extend
    - Etc...
- Build Prototypes
  - Single Purpose
  - Quick-and-Dirty

Nota Bene:

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

Basketball Apps Risk Mitigation

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

Risks and Prototypes

✓Risks

➢Prototypes

Aside: Capstone Transition

- From… “Make one of these.” –CSE Professor
  - Coding
  - Valuable Skills
- …To “Solve my problem.” –Customer/Client
  - Requirements Gathering
  - Design
  - Architecture
  - Highly Valuable Skills

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 (to Write) vs Best Software 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

- "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

Basketball Prototypes Case Studies

- Play Effectiveness

- Player Timer

Basketball 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?

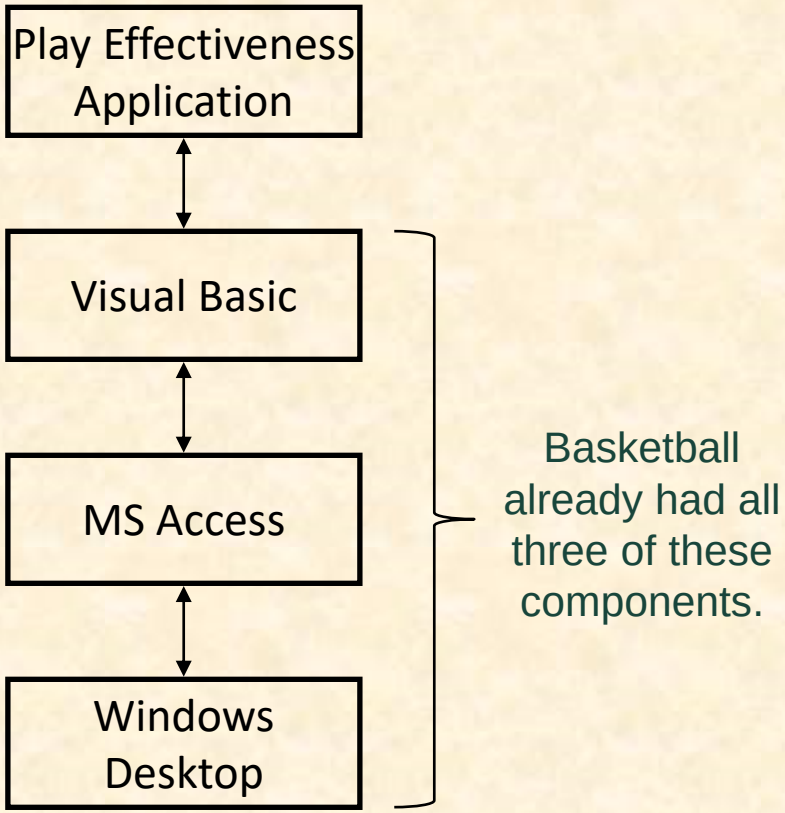
Initial Meeting with Video Coordinator

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?**

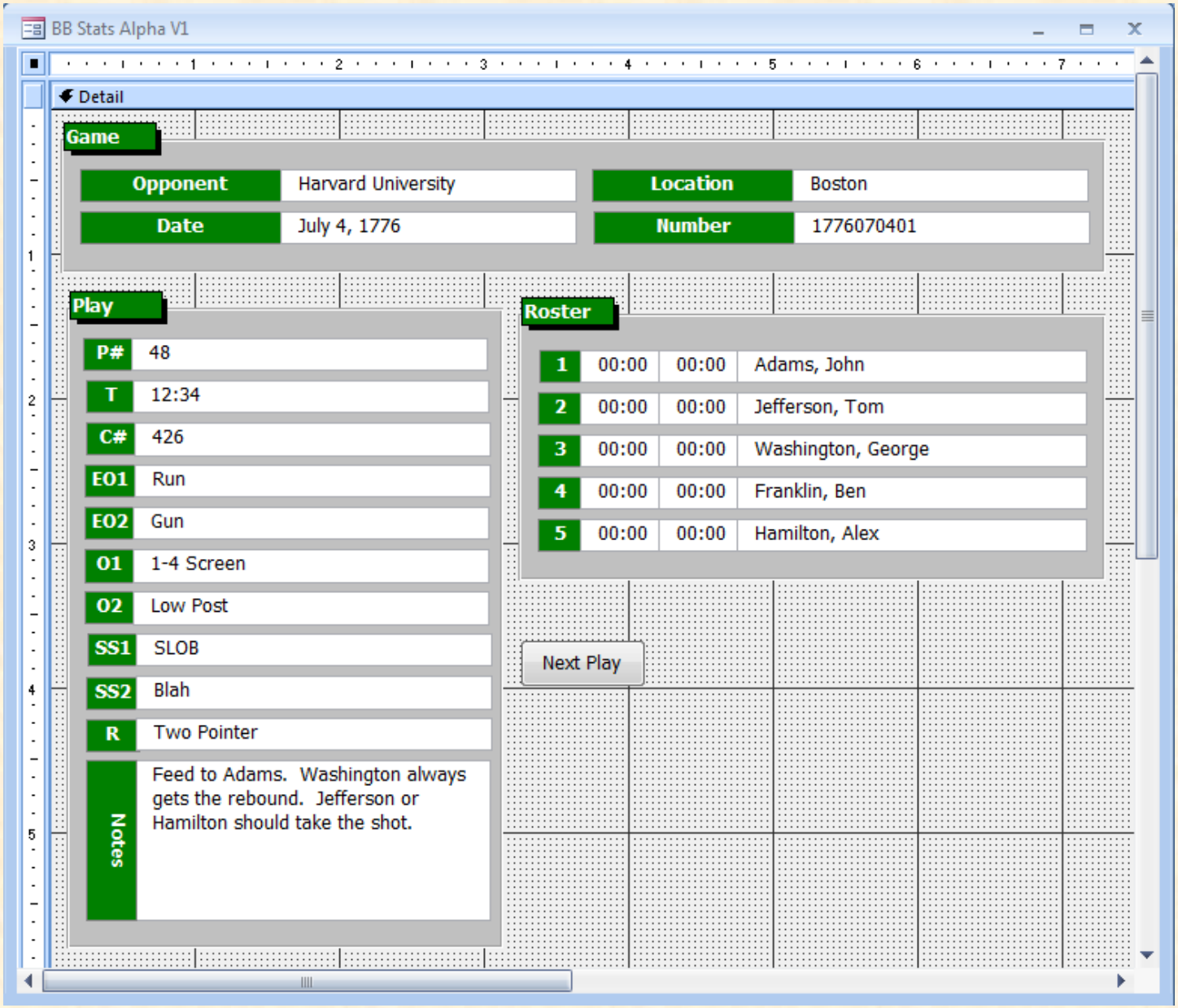
The Business Processes

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

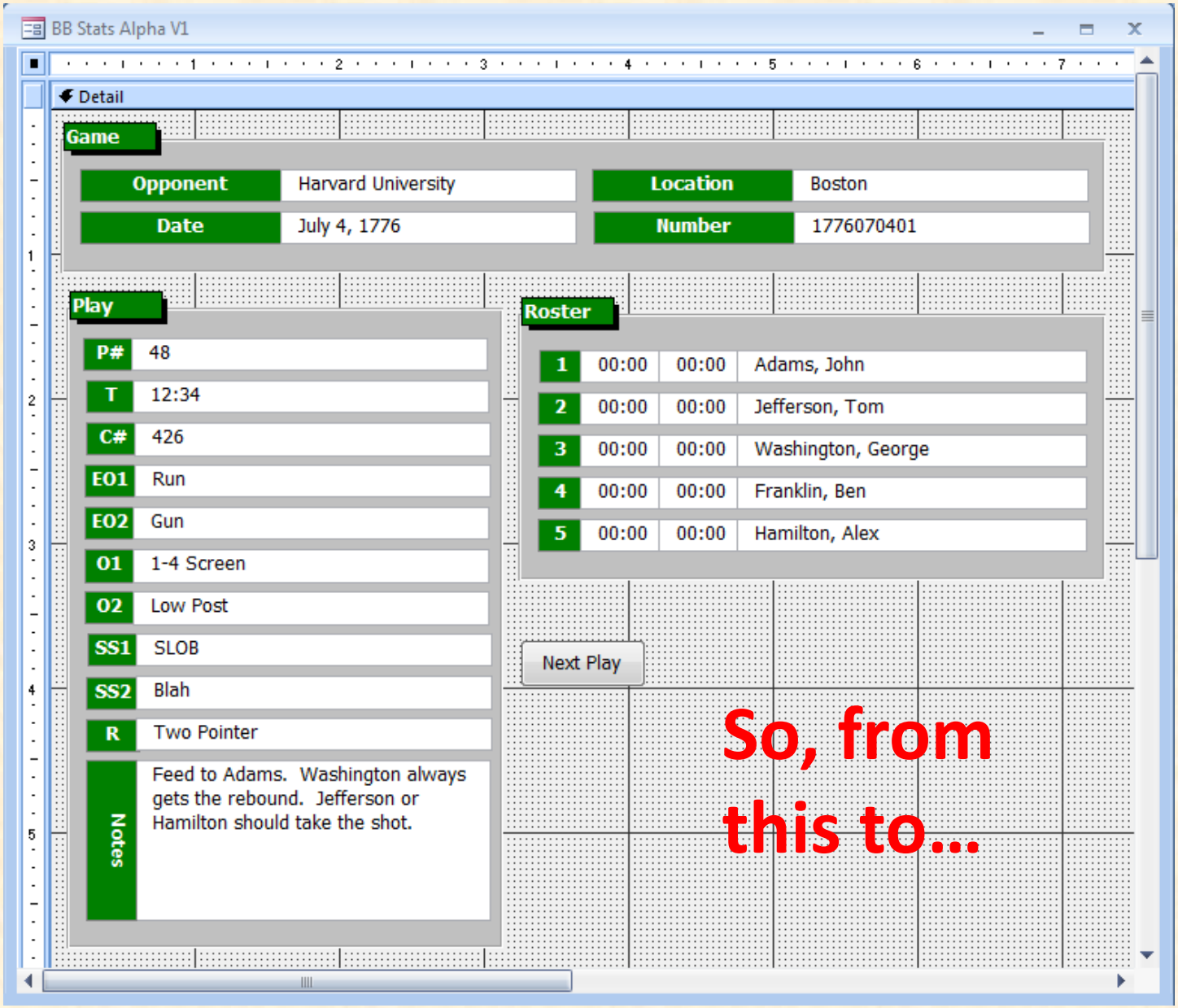
[1 of 2]

- 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
    - CS Paradigm: 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
  - X*N* Missed *N* Pointer (X1, X2, X3)
  - O*N* 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#)



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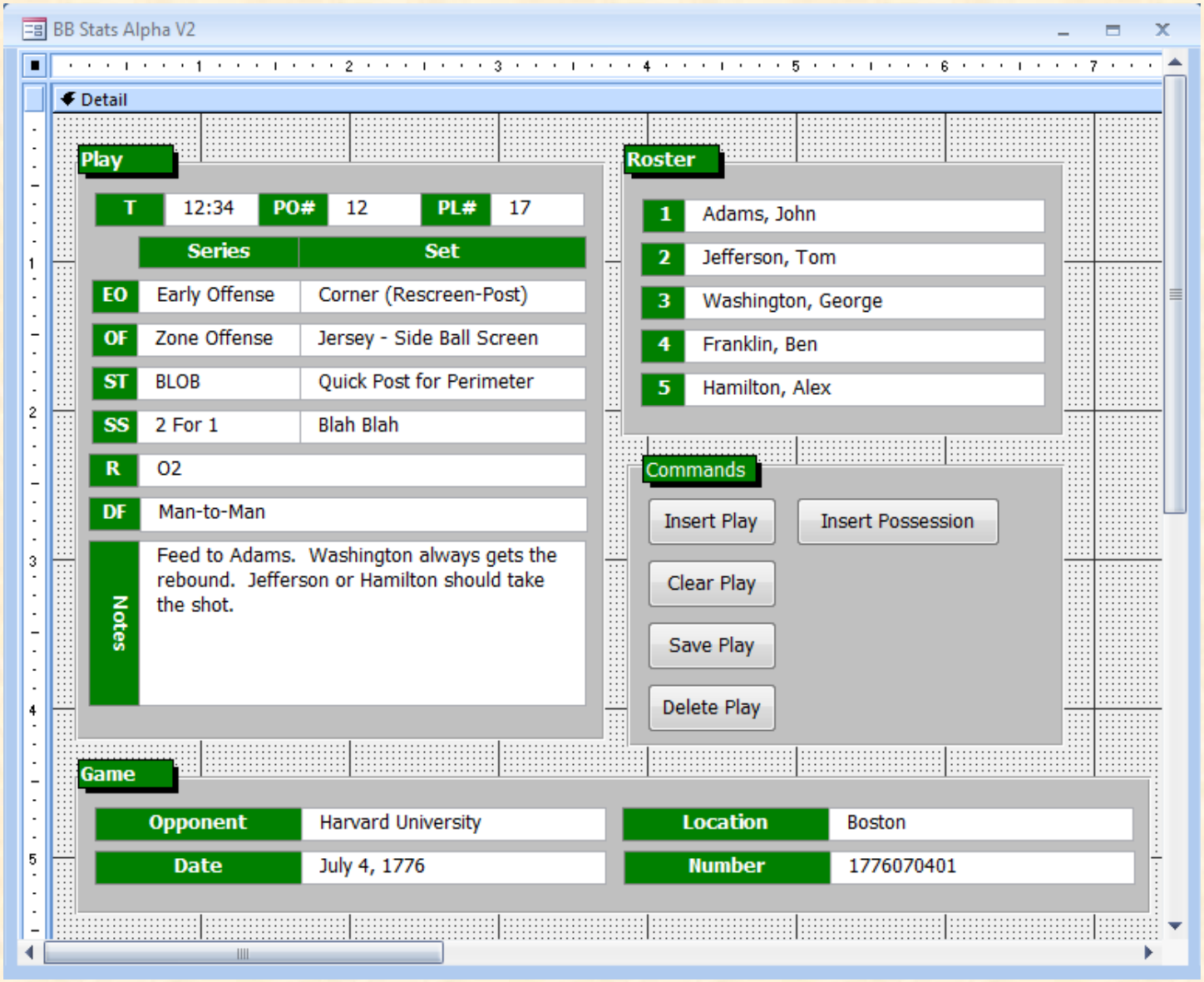


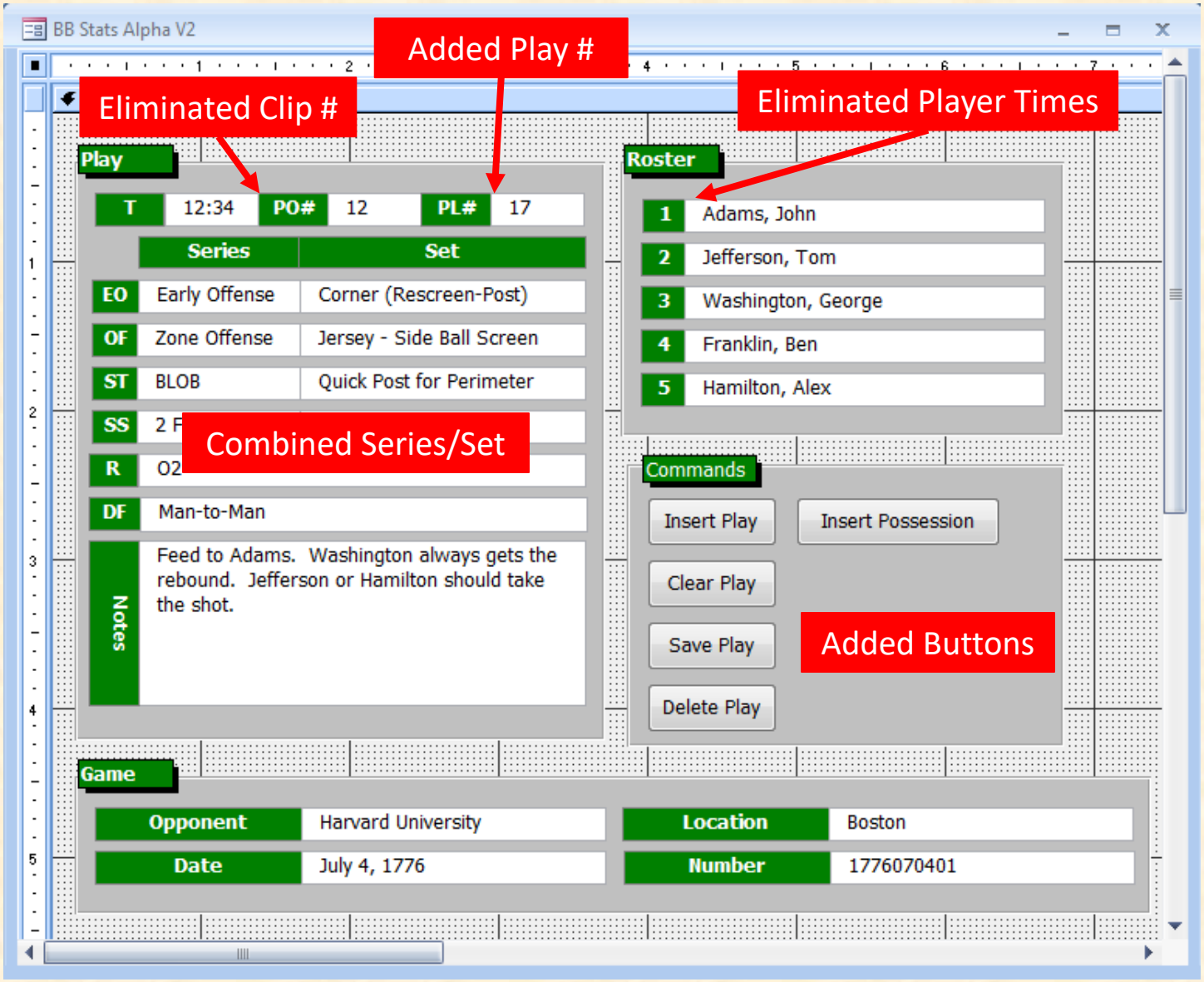
BB PE PV2

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



BB PE PV2

Fields

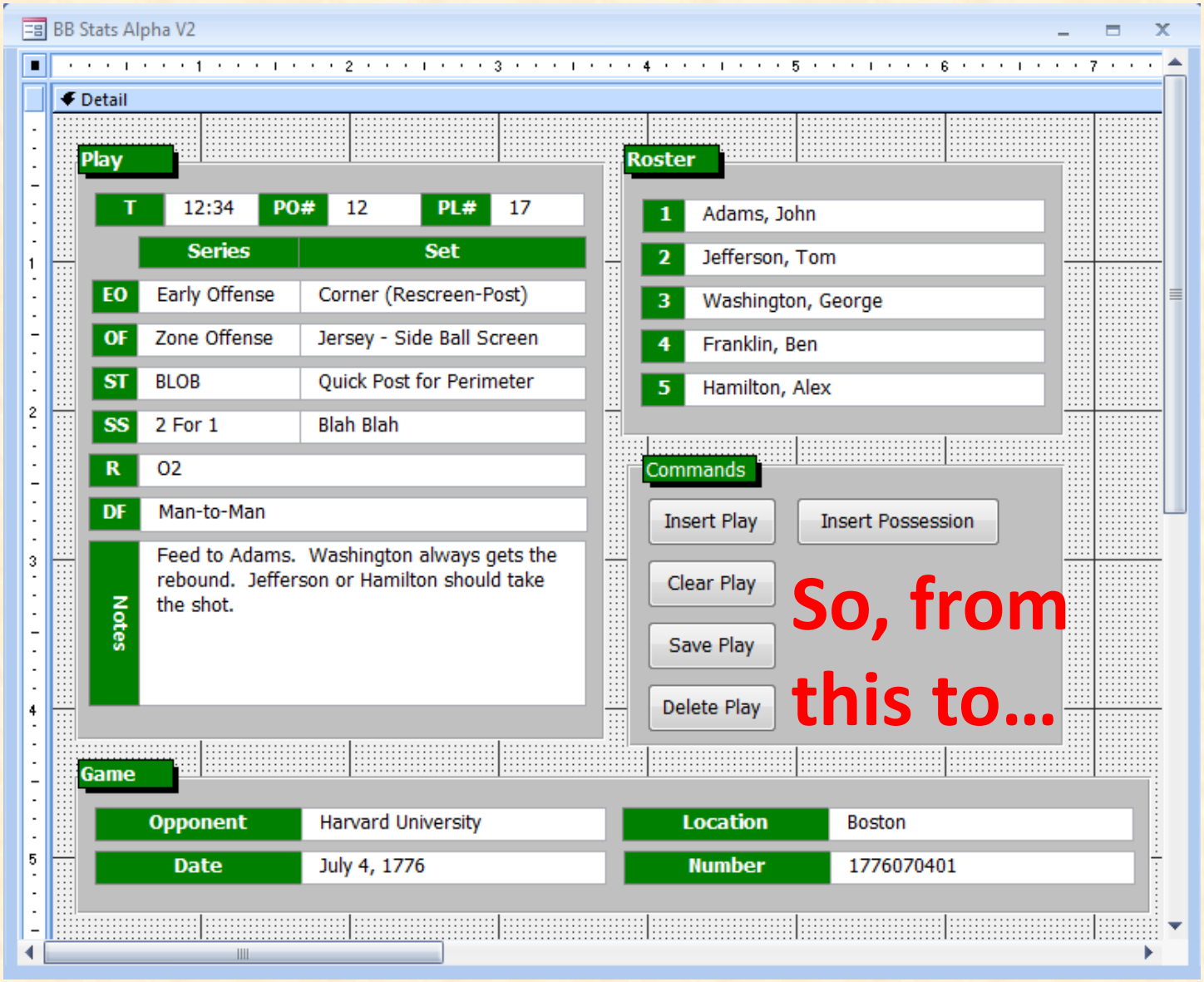
- PO#
  Possession Number
- PL#
  Play Number
- SS
  Special Situations
- DF
  Defense

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

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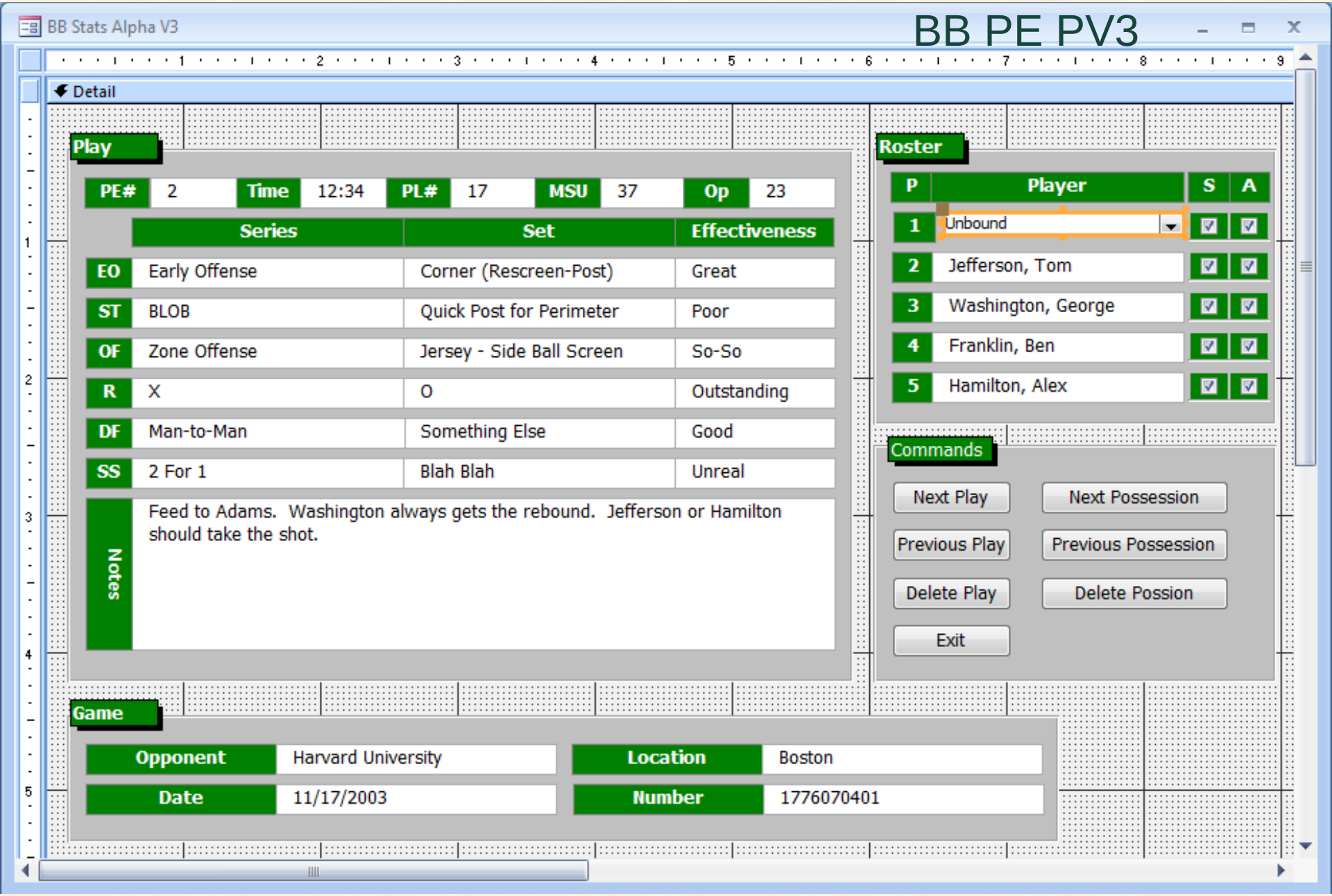
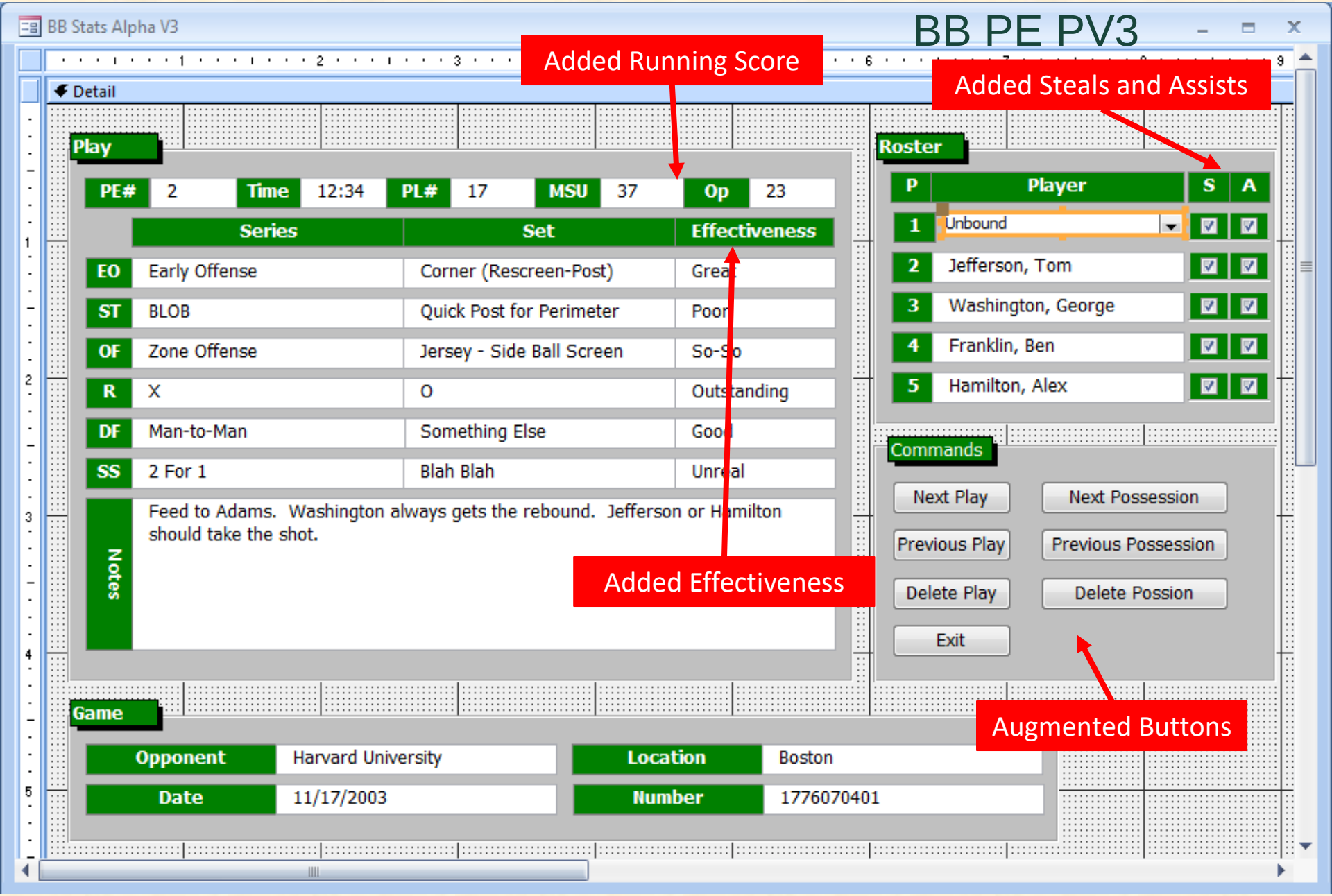

BB Stats Alpha V3
BB PE PV3
Detail
Play
PE# 2
Time 12:34
PL# 17
MSU 37
Op 23
Series
Set
Effectiveness
EO Early Offense Corner (Rescreen-Post) Great
ST BLOB Quick Post for Perimeter Poor
OF Zone Offense Jersey - Side Ball Screen So-So
R X O Outstanding
DF Man-to-Man Something Else Good
SS 2 For 1 Blah Blah Unreal
Notes
Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.
Roster
P Player S A
1 Unbound
2 Jefferson, Tom
3 Washington, George
4 Franklin, Ben
5 Hamilton, Alex
Commands
Next Play
Next Possession
Previous Play
Previous Possession
Delete Play
Delete Possion
Exit
Game
Opponent Harvard University
Location Boston
Date 11/17/2003
Number 1776070401


BB Stats Alpha V3
BB PE PV3
Added Running Score
Added Steals and Assists
Detail
Play
PE# 2
Time 12:34
PL# 17
MSU 37
Op 23
Series
Set
Effectiveness
EO Early Offense Corner (Rescreen-Post) Great
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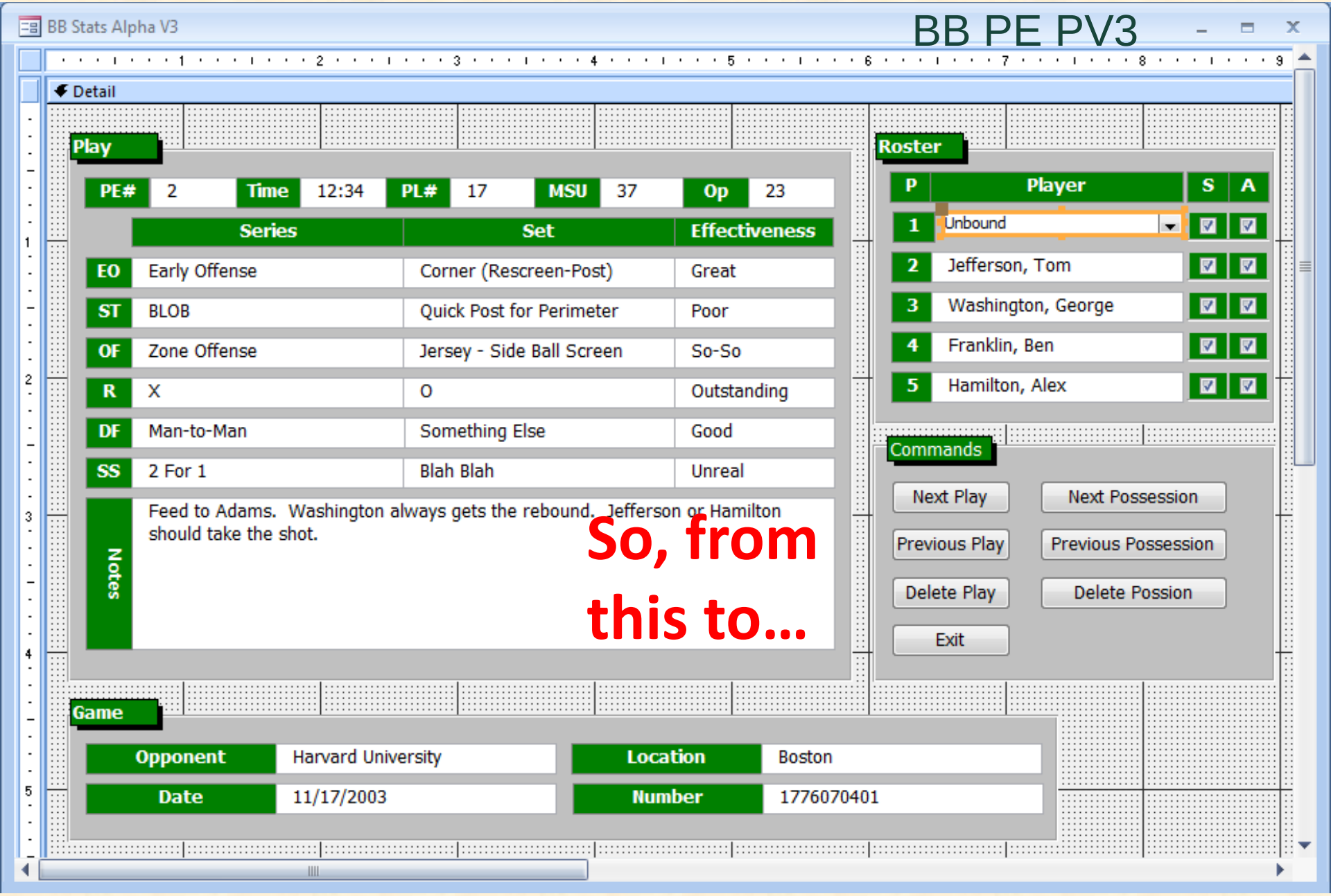
Added Effectiveness
Roster
P Player S A
1 Unbound
2 Jefferson, Tom
3 Washington, George
4 Franklin, Ben
5 Hamilton, Alex
Commands
Next Play
Next Possession
Previous Play
Previous Possession
Delete Play
Delete Possion
Exit
Augmented Buttons
Game
Opponent Harvard University
Location Boston
Date 11/17/2003
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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Detail
Play
PE# 2
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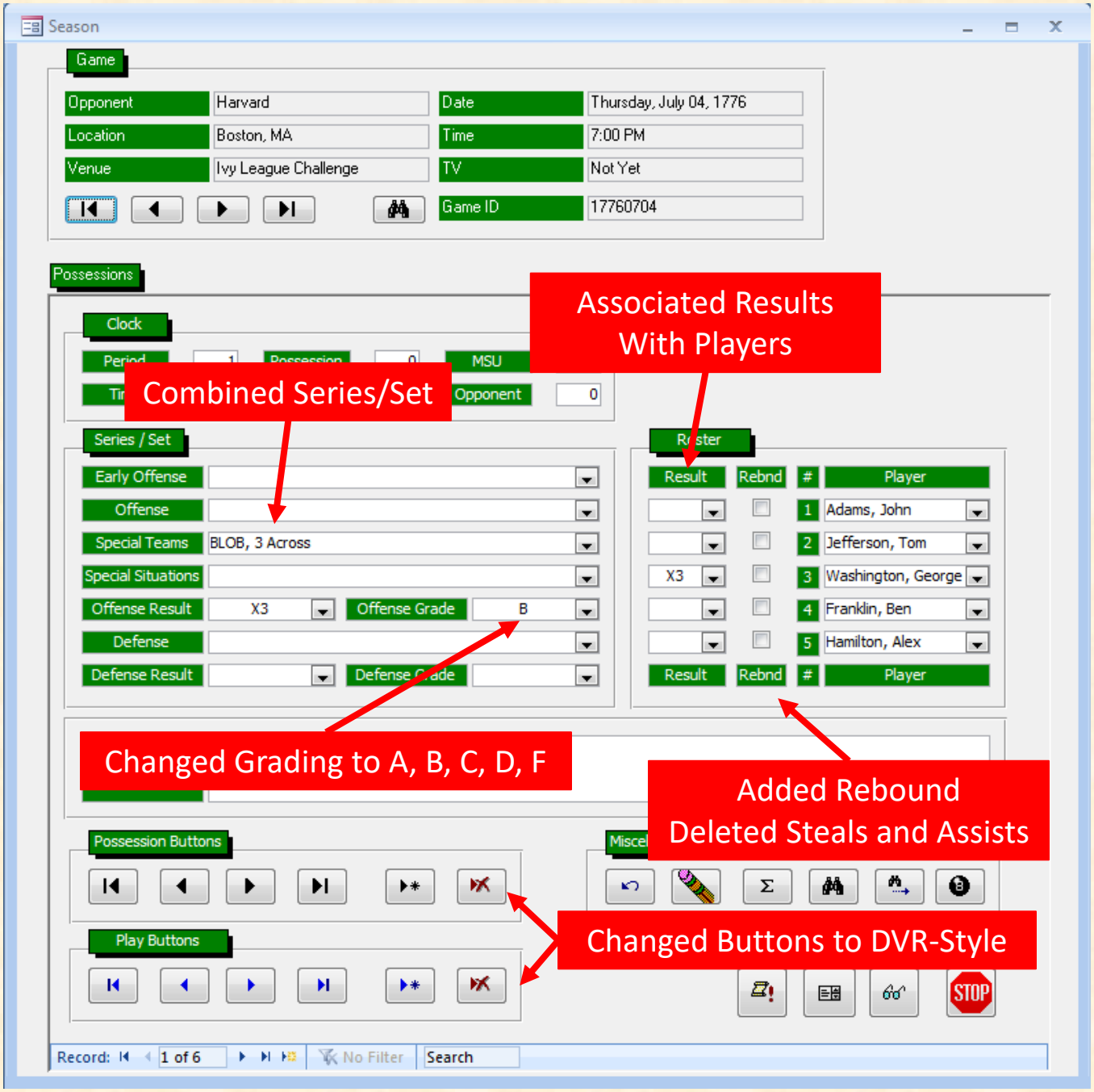
SS 2 For 1 Blah Blah Unreal
Notes
Feed to Adams. Washington always gets the rebound. Jefferson or Hamilton should take the shot.
So, from this to…
Roster
P Player S A
1 Unbound
2 Jefferson, Tom
3 Washington, George
4 Franklin, Ben
5 Hamilton, Alex
Commands
Next Play
Next Possession
Previous Play
Previous Possession
Delete Play
Delete Possion
Exit
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



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

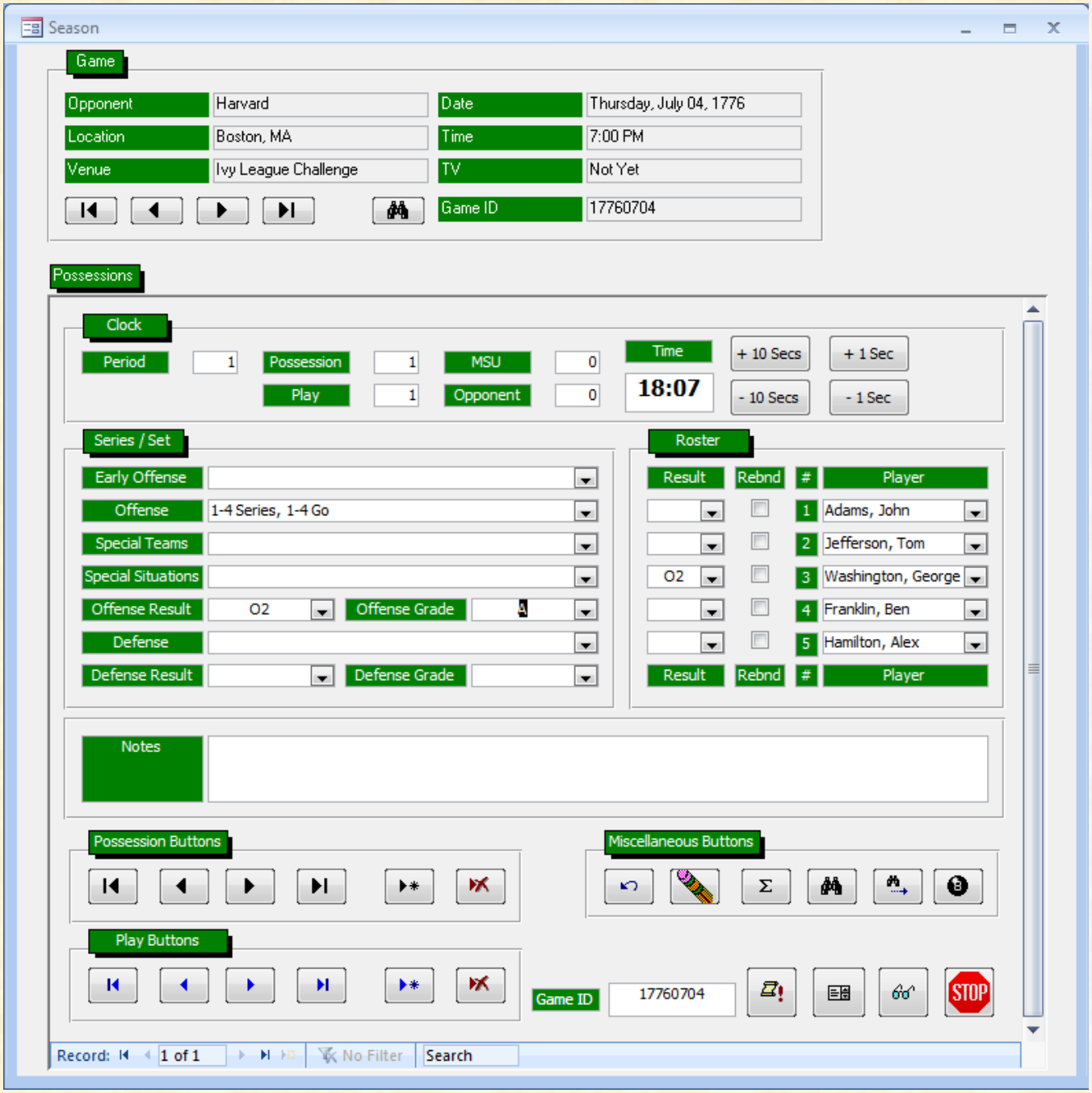
BB PE AV1

(Alpha Version 1)

First Version With Code

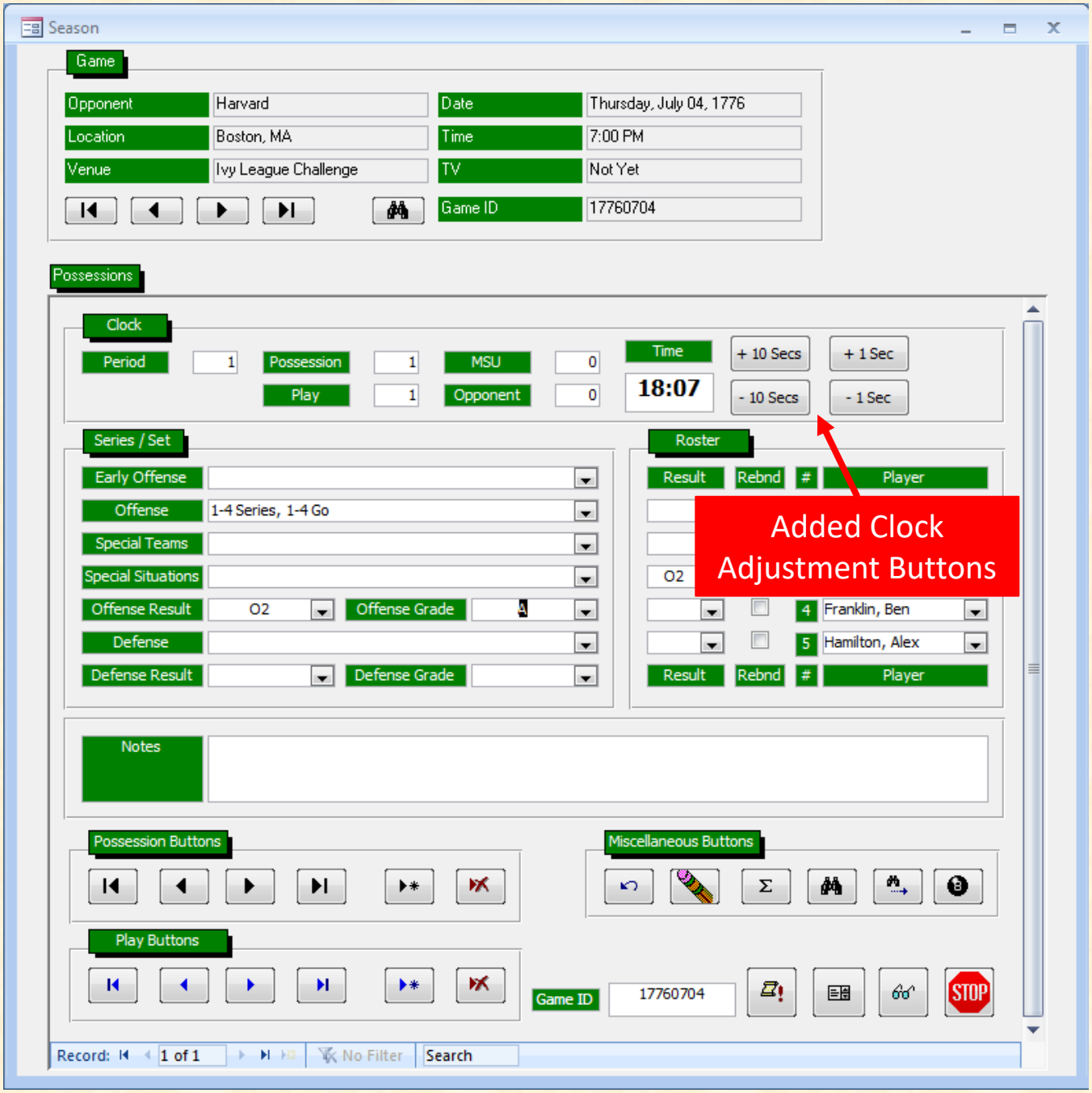
Not Much Implemented

So, from this to…



BB PE AV2

Still Not Much Implemented

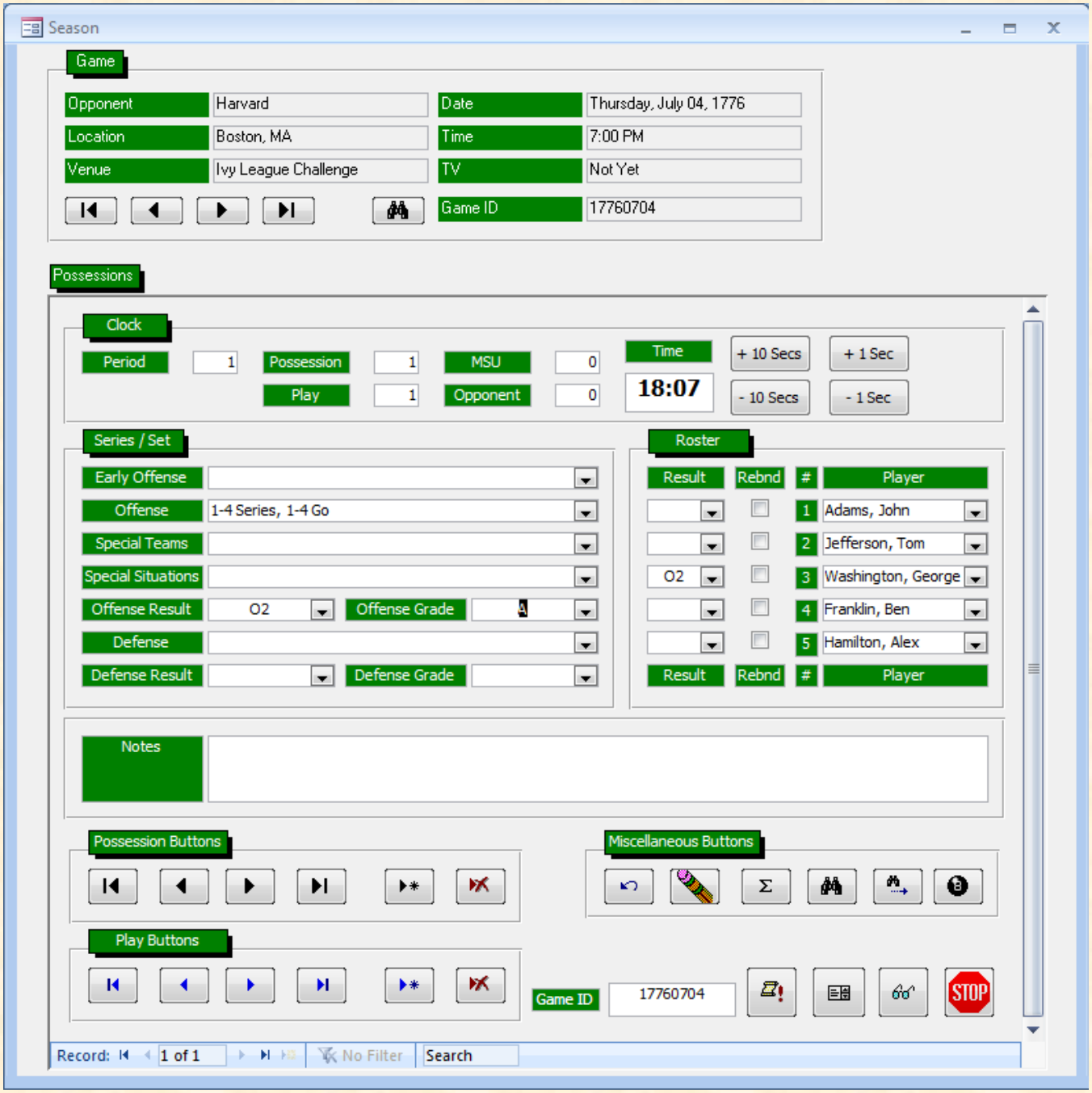


BB PE AV2

Still Not Much Implemented

BB PE BV1

(Beta Version 1)



Basketball Prototypes Case Studies

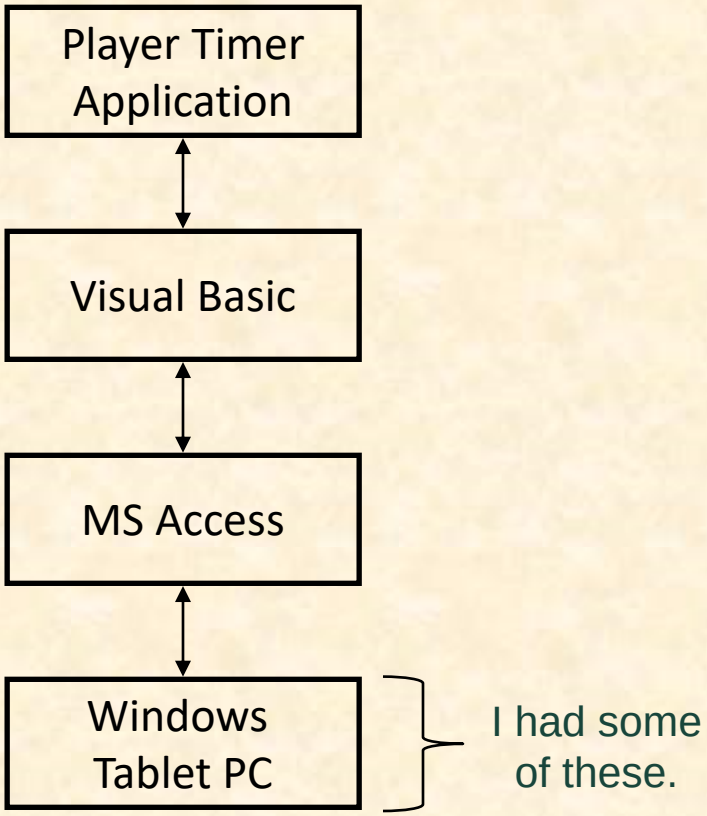
- ✓Play Effectiveness

- ➢Player Timer

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

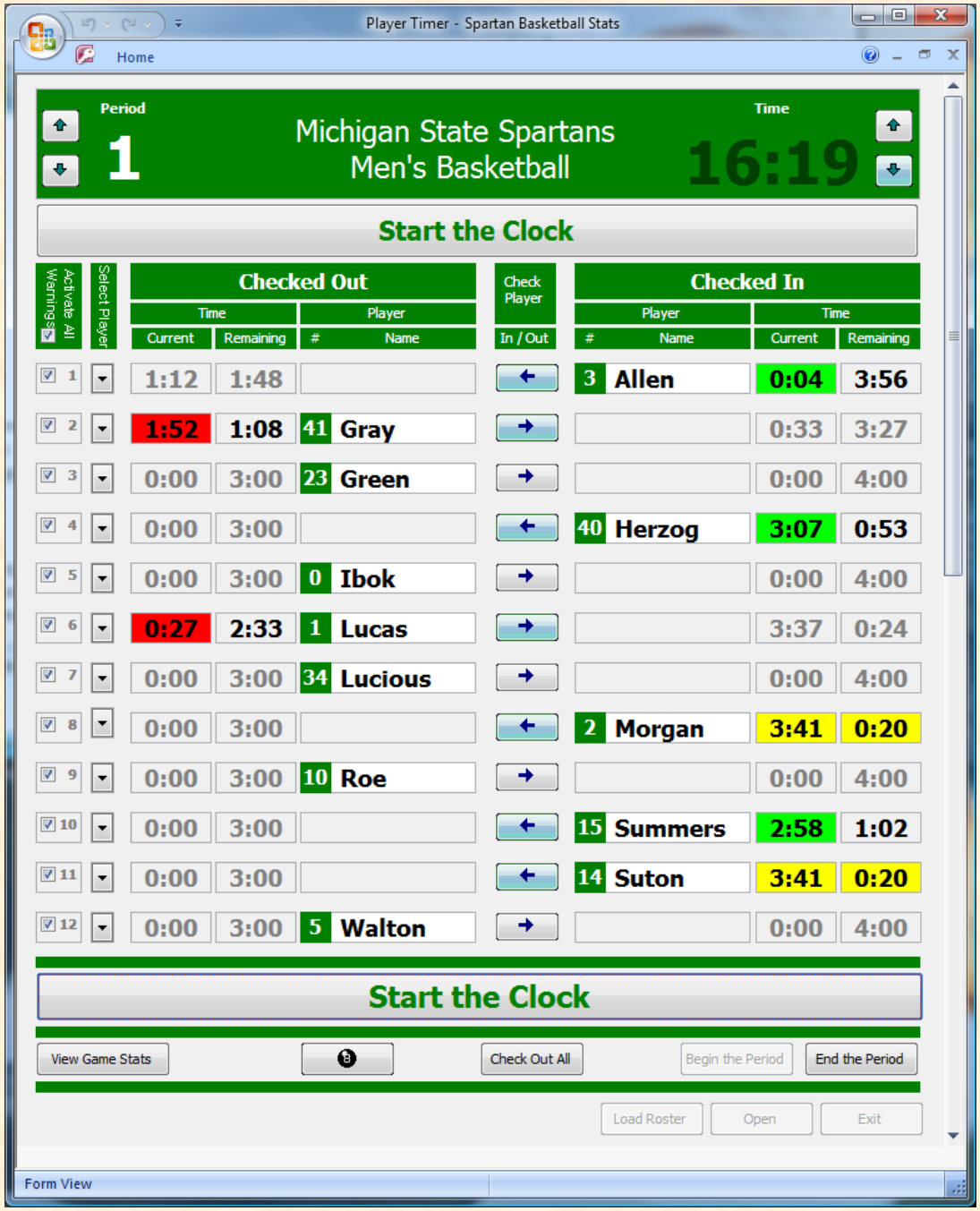
- Learning Basketball Processes
- Implementing Clocks in Windows?
  - Game Clock
  - Wall Clock
- Very Limited Screen Real Estate
  - Different Problem Than Mobile App
  - Must Feel Like Clipboard and Single Piece of Paper
- Computing and Displaying Cumulative Times
- Hidden Risk (“Danger Will Robinson!”)

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!

Aside: Great Example of Front-End / Back-End Architecture and Design



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

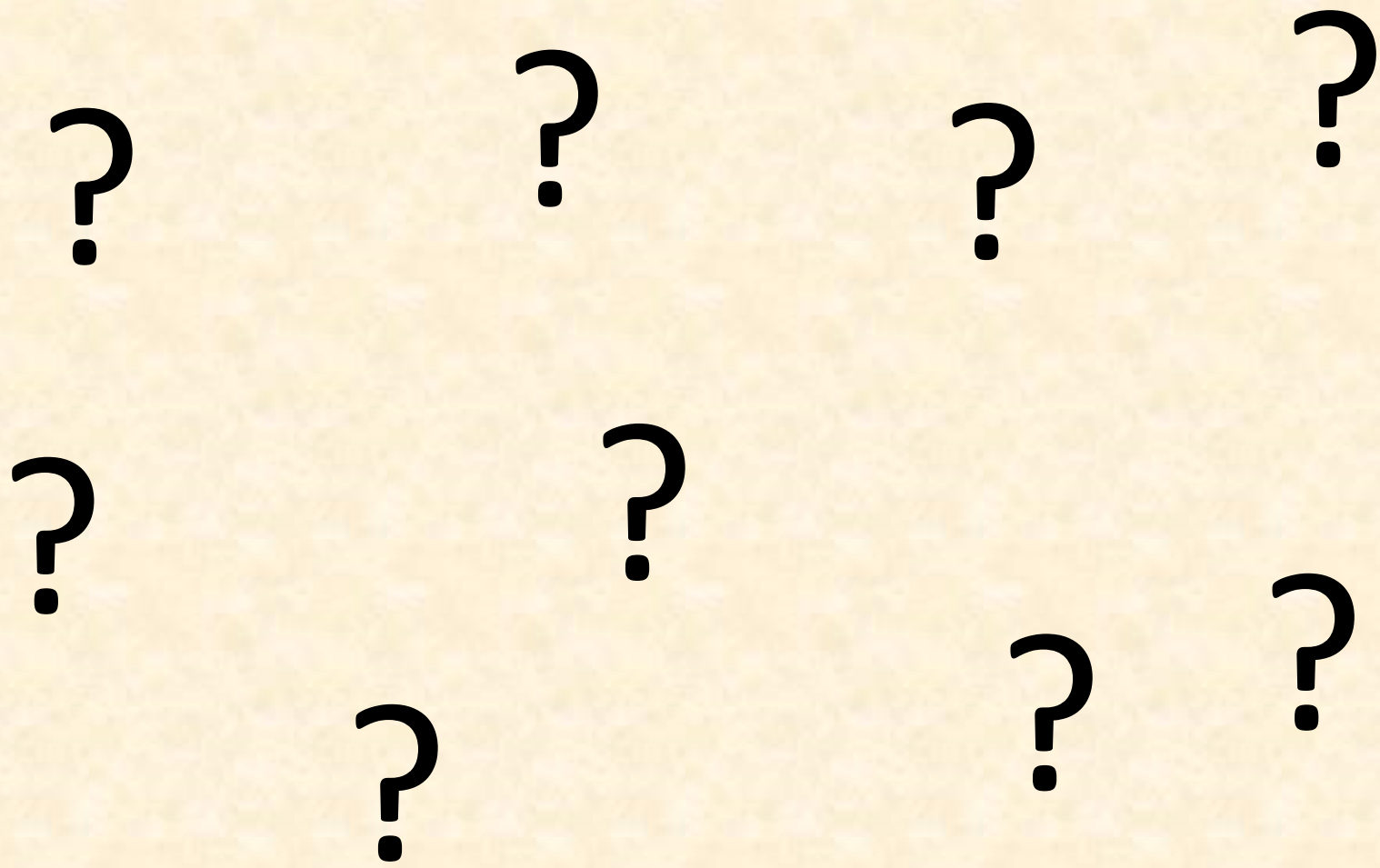
- ✓Play Effectiveness
- ✓Player Timer

Risks and Prototypes

✓Risk

✓Prototypes

Questions?



What's ahead?

[1 of 5]

- Upcoming Meetings
  - ~~09/13: Risks and Prototypes~~
  - 09/15:Team Status Report Presentations
  - 09/20: Project Plan
  - 09/22:Schedule and Teamwork
  - 09/27:Team Project Plan Presentations
  - 09/29:Team Project Plan Presentations
  - 10/04:Team Project Plan Presentations

10% of Team Grade

What's ahead?

[2 of 5]

- Split-Hands Meetings
  - Used On Presentation Days
    - 09/15: Team Status Report Presentations
    - 09/27-10/04: Team Project Plan Presentations
  - Split by Teams by Instructor
  - Microsoft Teams Channels
    - James Teams
    - Luke Teams
  - Attendance Taken As Usual

What's ahead?

[3 of 5]

- Team Photos
  - Individuals Submit Photos
    - High Resolution
    - Business Casual Dress
    - Head to Just below Knees
    - Hands at Side
  - Photographer Creates Team Photo
  - See Team Photos in The Capstone Experience
  - Google Form
    - Photo Release Form
    - Upload Photo
    - Due by 11:59 p.m., Friday, September 17

Team Volkswagen, Fall 2020

What's ahead? [4 of 5]

- Website, Email and Team's Messages
  - Check Constantly
  - Read Carefully
  - Not Seeing and/or Reading Email ≠ Valid Excuse
- Triage Meetings
  - Scheduled
  - Attendance & Preparation
- 09/27-10/04: Team Project Plan Presentations
  - Slide Deck Posted Online
  - Read and Review
  - Discuss in Triage Meetings
  - See examples on our Other Links > Downloads page.

What's ahead? [5 of 5]

- 09/15: Team Status Report Presentations
  - One Week From Today
  - Split-Hands Meeting
  - Slide Deck Template Posted on Downloads Page
  - Must Use Windows Version of Office 365 ← ***Nota Bene***
  - Read Submission Instructions Carefully
  - Due by 11:59 p.m., Tuesday, 09/14
  - Upload Two Times to Microsoft Teams
    - To General Channel File Space
      Folder "Team Status Report Presentation Slide Decks"
    - To Capstone Team's Private Channel
  - Aggregated Slide Decks
    - By Instructor
    - Instructors will "drive" during split-hands presentations.
    - Presenters will say "Next slide please."

Delete this slide.

Read Me

[1 of 2]

- Presenting
  - The Status Report Presentations will be given on Wednesday, September 15.
  - The purpose of the Status Report Presentation is to convince everyone that your team has scoped your project, understands the functional, design and technical specifications, and that your team has a crafted plan to develop, debug and deliver your project to your client on time (Wednesday, December 8) and on budget ($0).
  - 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.
  - Dr. D. will combine the teams' slide decks into two slide decks, one for James' teams and one for Luke's teams.
  - James and Luke will share and "drive" the slide deck for their teams.
  - We will meet in two "split-hands" meetings with one Teams channel for James' teams and one for Luke's teams.
  - Your team may have one or more presenters. All team members should turn their cameras on during their presentation.
  - The order of teams will be random.
- Creating and Editing
  - Use only the Windows version of Office 365.
  - You must use this PowerPoint slide deck template as is. Do not change the number of slides unless the instructions explicitly allow you to duplicate slides. Do not change the order of the slides. Do not change the styles. Do not edit the master slides.
  - Throughout the template, replace placeholders […] with the appropriate information.
  - Edit the center footer by clicking the Header & Footer button on the Insert ribbon. Change [Team Name] in the footer to your company name as in "Team TechSmith Status Report Presentation". If necessary, extend the width of the center footer textbox on the master slide, making sure that you re-center the enlarged textbox.
  - Do not include any company confidential information in your presentation.
  - Delete every textbox that includes "Delete this textbox" and every slide that includes "Delete this slide."

Delete this slide.

READ ME

[2 of 2]

- Submitting
  - All presentations are due to us and to your client by 11:59 p.m., Tuesday, September 14.
  - Name your PowerPoint slide deck file as “team-[team-name]-status-report-presentation.pptx” replacing “[team-name]” with your team’s name (using all lower case and replacing all blanks with dashes) in your filename as in “team-auto-owners-status-report-presentation.pptx”.
  - Upload your PowerPoint slide deck to the folder “Status Report Presentation Slide Decks” in our Microsoft Teams General Channel file space by 11:59 p.m., Tuesday, September 14. In addition, upload your slide deck to your team’s private channel file space in case your slide deck is deleted by accident from the General Channel file space, and you need to prove that you did indeed upload your slide deck by the due date and time.
  - Email a copy of your slide deck to your client as well by 11:59 p.m., Tuesday, September 14. Do not cc us on that email. Include some professional text in the body of your email to practice being a professional and to avoid having your email sent to your project sponsor’s junk folder.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

[Project Title 36pt]

The Capstone Experience

Team [Team Name 24pt]

[Team Member 1 16pt]
[Team Member 2 16pt]
[Team Member 3 16pt]
[Team Member 4 16pt]
[Team Member 5 16pt]
[Team Member 6 16pt]

Department of Computer Science and Engineering
Michigan State University

Fall 2021

From Students…
…to Professionals

Team [Team Name]

Status Report

[1 of 4]

[Project Title]

- Project Overview
  - Description Point 1
  - Description Point 2
  - Description Point 3
  - Description Point 4
- Project Plan Document
  - Status Point 1
  - Status Point 2
  - Status Point 3
  - Status Point 4

Status Information:
Think clicking "Status" on an Amazon order.

- You bought this on Wednesday, September 1. 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.

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

[Project Title]

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

Include status information.

Who's doing what?

Delete this textbox and the brace to the left.

Team [Team Name]

Status Report

[Project Title]

Risks

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

A "Risk" is a significant task that you need to accomplish that you currently do not know how to do. Usually, a risk is a "showstopper," meaning if you cannot complete the task, you cannot complete your project.

"Mitigation" for a particular risk is your plan for eliminating that risk; that is, your plan for figuring out how to accomplish the task.

List only "real" risks. For example, learning new computer languages is **not** a risk for an MSU CSE student.

Give "useful" explanations 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.