Saberlytics Software Suite

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Saberlytics Software Suite

Document Type
Undergraduate Project

Department
Computer Science

First Supervisor
Nicholas Bucciarelli

Subject Categories
Computer Sciences | Software Engineering

Comments
Final presentation for CSCI480: Senior Project.
PROJECT OVERVIEW

• Project Objectives & Description
• System Technical Overview
• Engineering Process Methodology
• Engineering Test Methodology
• Engineering Key Work-Products
  • Requirements Analysis
  • Architecture Development/Models
  • Test Strategy/Test Cases/Expected Results/Corrective Actions
• Project Key Metrics
• Project Schedule/Key Milestones
• System Preview
• System Demonstration
• Academic Key Knowledge Acquired/Applied
• Strategic Value
• Questions
• Lessons Learned
PROJECT OBJECTIVES & DESCRIPTION

• The primary objective of the Saberlytics Software Suite
  • To provide GMs, coaches, scouts, and data analysts a tool to house separate research in one unified software
  • Readily access the research
SYSTEM TECHNICAL OVERVIEW

- **Hardware:** Linux based server
- **Soft Technologies:**
  - MySQL Database
  - PHP 5
  - JavaScript
  - HTML
  - Bootstrap CSS 3
SYSTEM TECHNICAL OVERVIEW

- SYSTEM LEVEL DIAGRAM

![Diagram](image.png)
ENGINEERING PROCESS METHODOLOGY

• AGILE: Used as a project development methodology
  • Iterative design and build process
    • Allowed revisions and builds to be conducted in parallel
    • Ease of enhancement, refinement, and reduced errors
DEVELOPMENT PHASES - ITERATIVE

• **Phase 1:** Functionality Specifications

• **Phase 2:** Build a prototype for all tables and working data without a login system.

• **Phase 3:** Integrate Prototype 1 with user functionality
  • Login system
  • Project management
    • File uploads
    • Entering new reports
    • Player tear sheets
  • Realigned functionalities based on change in requirements

Project Mentor: Nicholas C. Bucciarelli, Ph.D
ENGINEERING TEST METHODOLOGY

• Test Methodology
  • Software Engineering Test – Unit Testing
    • Correct functionalities (Based on requirements)
  • Quality Engineering Test – Systems Acceptance Test
    • Compare SQLs results with industry leading resources
      • BaseballReference.com
      • Fangraphs.com

• Value of Testing
  • Validates the capabilities of the application to work as stated
ENGINEERING KEY WORK-PRODUCTS

• Requirements Document/Traceability
• Test Strategy (plans and executed results)

• Value of Work Products
  • Iterative, Evolving
    • Based upon Final Version of Application
### REQUIREMENTS TRACEABILITY MATRIX

<table>
<thead>
<tr>
<th>ID</th>
<th>Req. ID</th>
<th>Business Requirement</th>
<th>Functional Requirement</th>
<th>Technical / System Requirement</th>
<th>System Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>001/002</td>
<td>We need a system that will provide a software suite to analyze baseball player statistics</td>
<td>The system shall take data input from the RetroSheet Database.</td>
<td>The system shall allow the user to make selections through an SQL query builder.</td>
<td></td>
</tr>
<tr>
<td>002</td>
<td>003/004/005</td>
<td>The system suite shall contain reporting services for custom projections based on the statistical analysis and data modeling.</td>
<td>The reporting services shall allow the user to create custom statistical selections to develop a model.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>003</td>
<td>006</td>
<td></td>
<td></td>
<td>The system shall export the query to R for data modeling.</td>
<td></td>
</tr>
<tr>
<td>004</td>
<td>007/008</td>
<td>The system suite shall contain a player profile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>005</td>
<td>009/010</td>
<td>The system shall incorporate a queued comment section in the player profile containing scout name, scout picture, date added, tags, and the comment.</td>
<td>The comment section shall allow filters based on scout, date, and tags.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>006</td>
<td>011</td>
<td>The system shall display the athletes picture and basic statistics in the player profile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>007</td>
<td>012/013</td>
<td>The system shall contain GameDay Reporting functionality</td>
<td>The system shall be able to rapidly produce advanced opponent and player statistics for coaches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>008</td>
<td>014</td>
<td></td>
<td>The system shall display recorded Heat Map, Pitch FX, and matchup w/ Pitch FX images in the GameDay report.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>009</td>
<td>015</td>
<td></td>
<td>The GameDay report shall provide an opponent pitch breakdown for analysis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>010</td>
<td>016</td>
<td></td>
<td>The GameDay report shall queue recorded analyst comments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>011</td>
<td>017/018/019</td>
<td>The system shall incorporate a user login database.</td>
<td>The system shall provide specific login interfaces based on role.</td>
<td></td>
<td>The system shall allow for the roles of admin, coach, scout, and analyst.</td>
</tr>
</tbody>
</table>

**Project Name:** Statistical Baseball Analytic Software

**National Center:** St. John Fisher College

**Project Manager Name:** Dylan Hallagan & Cody Thomas

**Project Description:**
Provide a software suite to analyze baseball players using R for custom projections, a player profile for scouts in the organization, and on demand reports for coaches during games.
PROJECT KEY METRICS

• Number Open Tasks/Stories per Sprint
• Number of Changes in Requirements in Total
• Number of Changes to Source Lines of Code (SLOC)
### PROJECT SCHEDULE/KEY MILESTONE

- **Standard Senior Project Class Schedule for All Teams**

<table>
<thead>
<tr>
<th>ID</th>
<th>% Work Complete</th>
<th>% Complete</th>
<th>Task Mode</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
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<td>1</td>
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<td>24%</td>
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<td>Senior Project 2015</td>
<td>74 days</td>
<td>Mon 1/19/15</td>
<td>Thu 4/30/15</td>
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<td></td>
<td>Executive Summary</td>
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<td>Mon 1/19/15</td>
<td>Fri 1/30/15</td>
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<td>0%</td>
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<td>Requirements</td>
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<td>Mon 2/2/15</td>
<td>Mon 2/9/15</td>
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<td>Key Metrics</td>
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<td>Wed 2/11/15</td>
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<td>5</td>
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<td>0%</td>
<td></td>
<td>Architecture</td>
<td>5 days</td>
<td>Thu 2/12/15</td>
<td>Wed 2/18/15</td>
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<tr>
<td>6</td>
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<td>0%</td>
<td></td>
<td>Test Strategy</td>
<td>3 days</td>
<td>Thu 2/19/15</td>
<td>Mon 2/23/15</td>
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<tr>
<td>7</td>
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<td>Prototype Completed</td>
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<td>Tue 2/24/15</td>
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<td></td>
<td>System Reviews_1st Iterative</td>
<td>10 days</td>
<td>Tue 3/17/15</td>
<td>Mon 3/30/15</td>
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<tr>
<td>9</td>
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<td>0%</td>
<td></td>
<td>Test Strategy/Exection</td>
<td>2 days</td>
<td>Tue 3/17/15</td>
<td>Wed 3/18/15</td>
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<tr>
<td>10</td>
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<td>0%</td>
<td></td>
<td>Corrective Actions</td>
<td>3 days</td>
<td>Thu 3/19/15</td>
<td>Mon 3/23/15</td>
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<td>Mon 3/23/15</td>
<td>Tue 3/24/15</td>
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<td>Fri 3/27/15</td>
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<td>Thu 3/26/15</td>
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<td>Mon 4/6/15</td>
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<td>18</td>
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<td>Changes, if needed</td>
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<td>Wed 4/8/15</td>
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<td>Submit to Department Chairperson</td>
<td>1 day</td>
<td>Wed 4/15/15</td>
<td>Wed 4/15/15</td>
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</tbody>
</table>

Project Mentor: Nicholas C. Bucciarelli, Ph.D
SYSTEM PREVIEW

- Dashboard Page

![Dashboard Page](image-url)
SYSTEM PREVIEW

- Team Page

New York Yankees

The New York Yankees are an American professional baseball franchise based in the Bronx borough of New York City that competes in Major League Baseball's American League East division.

Total Payroll: $231,978,085.00  Average Age: 31  Manager: Joe Girardi

Batting

<table>
<thead>
<tr>
<th>Season</th>
<th>Team</th>
<th>G</th>
<th>AB</th>
<th>PA</th>
<th>H</th>
<th>1B</th>
<th>2B</th>
<th>3B</th>
<th>HR</th>
<th>R</th>
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<th>SB</th>
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<td>1136</td>
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<td>201</td>
<td>859</td>
<td>823</td>
<td>662</td>
<td>36</td>
<td>1136</td>
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<td>44</td>
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<td>1016</td>
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</tbody>
</table>

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Page rendered in 0.0002 seconds - Saberlytics Software
SYSTEM PREVIEW

• Player Page
### Project Management

- **Dashboard**
  - **Projects**

<table>
<thead>
<tr>
<th>No</th>
<th>ID</th>
<th>Player</th>
<th>Assignment</th>
<th>Status</th>
<th>Start Date</th>
<th>Deadline Reached</th>
<th>Actions</th>
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<tbody>
<tr>
<td>1</td>
<td>0015</td>
<td>Gian Carlo Stanton</td>
<td>Performance Analysis</td>
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<td>April 17, 2015</td>
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<td>Prospect Analysis</td>
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<td>Deadline Reached</td>
<td>Edit</td>
</tr>
<tr>
<td>3</td>
<td>0019</td>
<td>Manny Machado</td>
<td>Performance Analysis</td>
<td>Planned</td>
<td></td>
<td>Deadline Reached</td>
<td>Edit</td>
</tr>
</tbody>
</table>
ACADEMIC KEY KNOWLEDGE ACQUIRED/APPLIED

• CSCI 231: Data Structure and Algorithms
• CSCI 353: Database Structures
  • Database Architecture
  • Advanced SQL querying
• CSCI 375: Programming the WWW
  • PHP
    • Custom framework developed in PHP
  • Javascript/JQuery
STRATEGIC VALUE

• Value Proposition
  • Automated Valuation
    • Internal metrics
  • All franchise studies and work in one spot
  • Gameday Report Generation
LESSONS LEARNED

• SQL Database Structuring
  • With large databases time to render is a problem
    • Techniques for optimization
      • Crack a database into like queries/datasets
        • Example: Computed Player Statistics

• Advanced PHP
  • Login/Authorization
  • Session Handling
  • Background Fetchs
  • Dynamic pages rendering using AJAX Javascript/JQuery
QUESTIONS