The Computer Science Senior Capstone Experience

CSE498 Collaborative Design
Department of Computer Science and Engineering
Michigan State University
Fall 2007
Professor Wayne Dyksen
Course Objectives

- Complete a Large Software Project
  - Architect
  - Implement
  - Test
  - Document
  - Deliver
- For a Client
- From “Scratch”
- In 15 (Short) Weeks
Course Objectives

• Build and Administer Systems
• Use Advanced Tools And Environments
• Integrate Computer Science Knowledge
Course Objectives

- Work In A Team Environment
- Develop Communication Skills
- Develop Some Interview Talking Points
All-Hands Meetings

- MW, 3:00-3:50pm, CAS 172
- Presentations By
  - Professor
  - Teams
    - Status Reports
    - Demonstrations
    - Formal Presentations
    - Project Videos
  - Guest Speakers
All-Hands Meeting Agendas

08-27: Course Overview / Skills Inventory
08-29: Technical Specifications / Team Assignments
09-03: (Labor Day, No Meeting)
09-05: Project Schedule & Risk
09-10: Teams: Progress Reports
09-12: Prototyping
09-17: Teams: Technical Specifications / Schedule
09-19: Teams: Technical Specifications / Schedule
09-24: Teams: Technical Specifications / Schedule
09-26: Resume Writing & Interviewing
10-01: Creating & Giving Presentations
10-03: Comm Sci-Tech Exchange
10-08: Teams: Alpha Demonstrations
10-10: Teams: Alpha Demonstrations
10-15: Teams: Alpha Demonstrations
10-17: Teams: Alpha Demonstrations
10-22: Ethics
10-24: Intellectual Property and Copyright
10-29: Entrepreneurship
10-31: .NET Framework / C#
11-05: Teams: Progress Reports & Demos
11-07: Teams: Progress Reports & Demos
11-12: The Project Video
11-14: Camtasia Demo
11-19: Teams: Progress Reports & Demos
11-21: Teams: Progress Reports & Demos
11-26: Teams: Progress Reports & Demos
11-28: Teams: Progress Reports & Demos
12-03: Teams: Project Videos
12-05: Teams: Project Videos
12-07: Design Day
12-11: Teams: Project Videos
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Team 1 Auto-Owners Insurance

Project Overview

Vendor Management System (VMS)

- Build VMS to Manage Third-Party Business Partners (BP’s)
  - Software
  - Services
  - Technical Assistance
- Functionalities
  - Add, Delete, Modify
  - Merge (When One BP Buys Another)
  - Access and Display Related Documents (From Image Right Repository)
  - Track Renewals and Reviews
- Technologies
  - C#
  - .NET
  - SQL
Team 1 Auto-Owners Insurance
Architecture Illustrated 2/3
Team 1 Auto-Owners Insurance
Architecture Illustrated 3/3
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Team 2 Ford

Project Overview

Ford Safety Index: Automotive Warning System

- Enable Driver to Avoid/Prepare For “Travel Troubles” by Leveraging In Vehicle Internet Connectivity
- Monitor Alerts Of Vehicle Safety Features
  - Traction Control
  - Roll Stability
  - Air Bag Deployment
  - Excessive Braking
  - Etc.
- Match Alert Patterns to Internet Information
  - Bad Weather
  - Traffic
  - Accidents
  - Etc.
- Possible Scenarios
  - Issue Patterns
  - Central Driver Alert Service
  - Visual Mapping
  - Notify Authorities
  - Instrument Panel Simulation
For two weeks each year the world watches the US Open.

From real-time stats to SlamTracker, IBM serves up the action.

Take a look.
Project Overview

Enable Linux for Processor Folding

- **Processor Partitioning**
  - Partition Physical Processors into Logical Processor
  - Includes Dedicated Processors and Shared Processors

- **Dedicated Processor Sharing**
  - Intended to Make Use of Idle Dedicated Processors
  - Idle Dedicated Processor “Donated” to Shared Processor Pool (SPP)
  - Enabled by Turning on Flag in the Virtual Processor Area

- **Processor Folding**
  - Intended to Maximize Dedicated Processor Donation
  - Physical Processor Must Be Idle Before Logical Processors Donated
  - Pack Work Onto Minimal Number of Physical Processors
  - Must Tweak Kernel Dispatching Policies

- **Requires**
  - Linux Kernel “Hacking”
  - Running on IBM Multi-Processor Hardware
Team 3 IBM
Processor Folding Illustrated

- AIX
- Linux
- Linux

Power Hypervisor
Team 3 IBM

Processor Folding Illustrated

AIX

Linux

Linux

Power Hypervisor
Team 3 IBM

Processor Folding Illustrated

- AIX
- Linux
- Linux

Power Hypervisor
Team 3 IBM

Architecture Illustrated
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Project Overview

AJAX Based Management Console for the Agent Framework

- Remote Management of Entities
  - Complex, Heterogeneous
  - Routers, Switches, Etc.
- Agent Framework (Existing)
  - Agents Do Remote Management
  - Framework for Rapid Development of Agents
- Management Console (Proposed)
  - Interacts with Components Generated by the Framework
  - Manage Components
    - Query
    - Configure
    - Deploy
  - Graphical Interface via Web Browser
Team 4 Motorola

Architecture Illustrated
Sircon Corporation: Specializing in eBusiness for Licensing, Regulatory and Compliance Automation - Windows Internet Explorer

Sircon Web Site

Removing roadblocks to revenue for the insurance industry through producer lifecycle automation.

News
8/30/07
Sircon Corporation Marks 20-Millionth Transaction

8/21/07
Virginia Selects Sircon Corporation to Help Streamline Insurance Licensing and Regulatory Management

8/13/07
First Standardized Producer Appointment Forms Released By ACORD

View the recent web seminar on Anti-Money Laundering regulations
Click Here

What's New...
Sircon Ranks Highly in

Producer Services
Individual producers or licensing administrators can quickly and securely apply, renew and more using our online services.

Select a service from the menu.

State Information Center
Select a state from the dropdown menu to find state online services, department contacts, Web site addresses, and other helpful information.

Important Notices
2007 Minnesota Producer License Renewals
Idaho Insurance Licensing Services
Louisiana Licensing System Conversion Update
Team 5 Sircon
Team Picture
Project Overview

GUI Configuration Tool for Dynamic Interview

- Dynamic Interview
  - Interview in Which Subsequent Questions Depend on Answers
  - Similar to TurboTax
  - Currently Programmed “By Hand”
    - Time Consuming and Error Prone
    - Must Be Done by a Programmer

- Graphical Tool
  - Allows User to
    - Enter Questions with Answer Choices
    - Represent Question Dependencies
    - Generates XML Code Auto-Magically
    - Useable by Interview Designers (Rather Than Just Programmers)

- Technologies
  - Java
  - XML
  - Swing
Team 5 Sircon

Project Overview

New Sircon Client

Interviews With

Producer Express
(New Client Interview Web Application)

Provide the backend for

Registered Customer

Sircon Employee

Interacts With

Interview Configuration Interface (ICI)

Auto-Generates

XML Files
Functional Specifications

- File browser will allow the user to navigate through system directory, as well as project directory.
Team 5 Sircon

Functional Specifications

- Toolbox window containing the elements
- Elements are derived from the given schema
Functional Specifications

- Provide drag-and-drop functionality to re-organize form elements.
- Central panel for spatial layout of elements
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People everywhere are using TechSmith products to capture content from their screen in ways that help them communicate more clearly, create engaging presentations for diverse audiences, and analyze product usability and customer experience.

Screen Capture, Recording, and Presentation

Snagit Screen Capture

With this screen capture and editing tool, you can select and capture anything on your screen. Use the built-in image editor, then share with others to visually explain concepts, create clear documentation, and give your presentations a professional look.
Project Overview

Rich Media Collaboration

- Rich Interaction and Conversation About Audio and Video Clips
  - More Than Playback, Text Commenting and Social Network Tagging
  - Like motionbox.com, veotag.com, or viddler.com
- Solution Based on Microsoft's Silverlight Technology
  - Screen Recording Tool
  - Content Hosting and Delivery Server
  - Silverlight Application and Web Site
    - For Both Content Author and Content Audience
    - Provide Rich Collaboration
- Requirements
  - Windows and Mac OS X Support
  - Browsers that Support Silverlight v1.1
- Technologies
  - C++ or C#/.NET or Both
  - TechSmith Screen Recorder SDK
  - Microsoft Silverlight v1.1
  - XAML, ASP.NET, HTML, CSS, Javascript, AJAX, Etc...
  - Microsoft Windows Presentation Foundation
  - Microsoft Windows Media Format SDK
  - Microsoft IIS
Interaction

Diagram:

- **Screen Recorder**
  - Upload Video
  - Get Video Tags

- **Website**
  - Add Video Tags
  - Host Video
  - Save Tags
  - Get Meta Data and Tags

- **Player**
  - Get Video Tags
  - Host Video

- **Database**
Team 6 TechSmith

Database

User
- UserID :: Guid
- Username :: Nvarchar(128)

Content
- ContentID :: Guid
- UserID :: Guid
- Title :: Nvarchar(128)
- Description :: NVarchar(128)
- Date :: DateTime
- Path :: NVarchar(128)

Tag
- Type :: SmallInt
- TagID :: Guid
- UserID :: Guid
- ContentID :: Guid
- StartTime :: DateTime
- EndTime :: DateTime
- Color :: NVarchar(32)

ArtTag
- TagID :: Guid
- Points :: Ntext

TextTag
- TagID :: Guid
- XLoc :: Int
- YLoc :: Int
- Text :: NVarchar(128)

Guid - Globally Unique Identifier
Nvarchar - Unicode Char Array
Ntext - Unicode String
Recorder Mockup

Video Title: Mspaint Tricks!

Description: This is a really cool video of me using MSPAINT!

Video Length: 1:34

Options:
- Record Video
- Record Whole Screen
- Record Selected Window
- Record Audio

Username: CoolDude2000
Player Mockup
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Auto-Owners Insurance

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Business
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Team 1 Auto-Owners Insurance Status Report
Team 1 Status Report

- Auto Owners Insurance
  - Met with Tim/Doug on Sept 4th
  - Next meeting set up for Sept 11th
  - Discussed Project Specs. Got a tour!

- Team Meetings
  - Have met multiple times
  - Set up IIS/Server/Skeleton of Tech Spec

- Team Organization
  - Tony - Client Contact, Joe - Group Website Admin
  - Chad - Technical Writer, Chung-Hua - Graphics Design
Team 1 Auto-Owners Insurance
Weekly Triage Meeting with Matt
Functional Specifications

- 4 distinct user group permissions: Administrator, IT management, Purchasing, and Legal
- Ability to add / edit / delete
- Search functionality for contracts / services and vendors
- Built-in security features including login and private data items
- Ability to have a running list of “notes” (blog style) associated with data items
Current Progress

Current Features:
- Management of all relative entities
  - Contracts
  - Vendors
  - Users
- Notification of Critical Data
- Security
- Database Integration
- Easily Extendable
- Data-Access Layer (DAL)
Team 2 Ford
Status Report
Project Overview

- Current/Past Automotive Safety Systems
- Statement of Problem
  - Partial Integration
  - Restricted Focus
- Proposed Solution
  - Project Assumptions / Scope
  - System Overview
Team 3 IBM
Technical Specifications Presentation
• A command line interface is needed related to the CPU levels. This program should verify visually if the folding is occurring and provide statistics.

• Command line program to turn processor folding on and off is required as well as a boot menu entry.

• Command line program is required to set a threshold at which processor folding will occur. In other words, when the processor utilization crosses a threshold, the kernel will begin the process of folding the processor.
Team 4 Status Report

- Client Contact
  - Weekly conference calls have been scheduled
  - Access to Motorola wiki granted
- Team Meetings
  - Bi-weekly meetings set up
  - Triage also set up
- Team Organization
  - Strengths and technical skills have been evaluated, but no set team positions have been assigned yet
Project Schedule

1. Run agent
   a) Compile Agent Framework code to execute Agent
   b) Date: 9-18

2. Sensor
   a) Add and remove a Sensor from an Agent
   b) Date: 9-18

3. GUI Prototype
   a) Design GUI Prototype
   b) Date: 10-08

4. Implement MVC
   a) Implement Model View Controller Design Pattern
   b) Date: 10-08

Team 4 Motorola
Technical Specifications Presentation
Team 4 Motorola
Technical Specifications Presentation
Team 4 Motorola
Team Meeting in the Capstone Lab
Team 5 Sircon

Status Report
Team 5: Sircon
Technical Specification Presentation
Functional Specifications

- File browser will allow the user to navigate through system directory, as well as project directory.
Functional Specifications

- Provide drag-and-drop functionality to re-organize form elements.
- Central panel for spatial layout of elements
The Solution

- Interview Configuration Interface (ICI)
  - Cut delivery in half (est. 2 weeks)
  - Cost-effective
    - Developed pseudo in-house
    - XML expertise not necessary
  - Efficient, graphical design
  - Simple, easy to use interface
Structure of an Interview

- Workflows (GroupRules.xml)
  - Divided into stages, each stage is a page
  - Each stage contains groups
- Groups (FieldGroups.xml)
  - Contains relevant information
  - Collections of fields
- Fields (PacketFields.xml)
  - Contain rules and descriptions for each element (button, textfield, radio, checkbox, etc.)
Team 5 Sircon
Working in the Capstone Lab
Team 6 TechSmith
Status Report
Team 6 TechSmith
Technical Specification Presentation
Functional Specifications

- Website
  - Allows users to find videos
  - Shows thumbnails of videos
- Web Services
  - Upload video
  - Get Tags
  - Get Meta Data
  - Add Tags
- Hosts WMV
- Hosts Silverlight Player

Team 6 TechSmith
Technical Specification Presentation
Website

- Login
- Video Upload
- Video Search
- Player Embedded

Open Website

Diagram:
- Screen Recorder
- Player
- Website
- Database
Team 6 TechSmith
Working in the Capstone Lab
View of Spartan Stadium
From the Capstone Lab