

Project Descriptions

Team 1. Auto-Owners Insurance: Java-Based System for Settlement Options for Annuities

We have a Basic based DOS system that creates proposals for potential structured settlement policies. The system allows for several different settlement options including period certain, life, and lump sum. Each option has a corresponding mathematical formula that calculates premium values.

We would like to convert the current Basic based DOS system to a Java based Web system. The new system will retain all of the current system's functionality in addition to several enhancements. The new system will collect all needed data, use the data to calculate results, display those results to the screen, and have the ability to save data in a relational database such as DB2. Also, it will need to be able to produce printed output and XML output that can be imported into the current mainframe system.

The ability to search the proposals by various attributes such as, but not limited to, name, date, and/or policy number will be needed. There can be multiple proposals for each policy. We currently allow for up to 20 proposals on each policy, but that was just a limitation of the current system. The new system should allow for an unlimited amount.

All edits and limits in the current system will need to be retained in the new system unless otherwise specified. You will be given the actual source code in both electronic and printed forms for reference. The best way to understand the system may be to simply run the current system through several test scenarios. A copy of the current web standards will also be included with the documentation. It is important to understand and follow these standards to maintain a uniform look and feel between multiple applications.

Team 2. ChannelVantage: Web-Based Data Entry Tool for General Motors

General Motors is dedicated to developing and maintaining strategies for each dealership located in the United States. Such strategies contain information concerning opening, closing, relocating or even realigning dealerships. To help facilitate General Motors with the development of these plans, for over 7,000 different dealer sites, ChannelVantage developed a Microsoft Access application for data entry. This application allowed General Motors personnel to quickly develop plans using pre-defined and legally approved text. One problem with this approach is that much of the current interface is cluttered with buttons and controls that are used to develop standardized text. When General Motors personnel have finalized strategies they wish to publish, there is a multi-step manual process that must be performed by ChannelVantage to get those plans uploaded into a GM mainframe.

The purpose of this project is to solve two primary pains shared between General Motors and ChannelVantage. 1) Develop a better user interface which will make it easier for GM personnel to enter in data. 2) Convert the system to a web application which will help facilitate ChannelVantage in eliminating the need for manual intervention, via use of automated web services, to transfer data to and from GM's mainframe.

Technology to be leveraged include: ASP.NET 2.0, SQL 2000 and C#

Team 3. Ford: Vehicle-Based Social Network

Overview: Before the end of the decade a vehicle and its occupants will be able to connect to the Internet while traveling opening up a whole new universe of in-vehicle computing applications. Many of these applications will require people to be able to connect to other vehicles on the road and thus social networks (like mySpace and Friendster) that create connections between users have received recent attention by a number of automotive manufacturers.

There are several differences in the use cases between social networks on a PC and used in a vehicle.

1. First, on the PC, the majority of social networks (with the notable exception of Dodgeball) do not tie a user to their present location. In the car, social networks will have to be able to constantly associate a user with a specific location to allow applications such as "find a friend nearby".
2. Second, social networks will require "stickers" for each user or perspectives to be placed on objects; in other words a major benefit of social networks in cars will be to allow "show me my friend's restaurant picks in this new town" and similar functions.
3. Third, privacy while in the vehicle is key, requiring special measures to stay "hidden" from others.
4. Finally, car events must be broadcast to the networks, such as "flat tire—find anyone nearby."

Task: The MSU team, in conjunction with Ford, will design and implement a social network suitable for use within a vehicle from initial design to end product. Ford Motor Company will provide the following:

- Initial use cases on applications we would like to see built
- Initial data structure
- Event handler to simulate vehicle events (from CSE 498 Fall 2005 team)

Milestones: Milestones, aligned to the course syllabus, will be established jointly between the MSU team and the Ford teams during the first two weeks of the course.

Considerations

- Intuitiveness of design (ease of use without instruction)
- Extendable Architecture -to allow the integration of future technology
- Safety /Ergonomics
- Cost

NOTE: Resulting component does not need to be packaged in an actual automobile.

Sample Use Cases

In Car

1. Locate and view network members on a map
2. Search by a member's name in a network and output location on a map
3. Search for network members currently within a given radius of one's location and output their locations on a map
4. Send a "need help" message to network members in a given radius
5. "Hide" from all users
6. "Block" certain users or certain clusters
7. Get a recommendation in the area from one's network

Out-of-Car

1. Create a link to a friend
2. Update a profile
3. Link a car to a person (many to many relationship)
4. Create a new flag (an entity that can be reviewed, such a restaurant)
5. Update a perspective of a flag
6. Name a subset of one's network (carpool cluster, family cluster)
7. Search by a member's name in a network and output location on a map

Team 4. Identity Alliance: Web Applications for ID4Sure Web Based Smart Card Framework

This project will involve the usage of cutting edge smart card devices and their interaction over the internet. Using the Identity Alliance ID4Sure framework, the students will produce 3 applications which make use of the smart card.

The first application is a password manager / wallet. It will be used to store and retrieve passwords from the card protected by a user pin number on the card.

The second application is a medical health wallet which will allow patients to store and retrieve critical medical information to and from the smart card protected by a pin number. The third application is up to the students to come up with a new application which makes use of the smart card over the web. Identity Alliance will provide all the necessary hardware/software and initial tutorials in order to complete this project. The final project should be organized as a web site / portal where a user can choose the application to be run. Students may make use of Php, JavaScript, LUA, HTML, others and potentially MySQL depending on the application. This should be a fun project.

Team 5. Image Space, Inc.: External Real and/or Post Time Telemetry for rFactor

Overview

This project includes extracting data from Image Space Inc commercial product rFactor. rFactor is a racing simulation platform that allows custom racing circuits and vehicles. To achieve the goals of this project we would be looking for an external application that displays color 2D or 3D graphics to achieve visual information displays. We would also want the application to be generic enough to accept any form of data given a 2 dimensional requirement. This latter requirement follows some of our basic design rules of flexible software from the end users point of view.

Essential Design Tasks

High Level

- Generic parsing and off line calculation of telemetry data.
- 2D or 3D rendering of telemetry information.
- Auto scaling of information to fit in arbitrary window size.
- Custom Graphics for later modification/development
- Use of rFactor plugin interface

Low Level

- Displaying of max/min values
- Displaying of position relative to track
- Displaying of accelerator position

Team 6. Microsoft: Peer to Peer Application Templates and Controls

Microsoft has created a Peer to Peer platform, which enables building applications for Peer to Peer Real Time Communications, Collaboration and Content Distribution. The specific technology offerings include a peer name resolution protocol (PNRP), peer to peer multicast (Mesh Protocols) that works on the Internet, a peer to peer security model, and Peer to Peer Session Initiation. However, the developer interfaces provided today represent low-level building blocks; they do not provide high-level abstractions that enable rapid application development for common communications, collaboration, and content distribution scenarios.

This is a large project, and might span two semesters. The goals of the project are as follows:

1. On top of the base Microsoft p2p technologies, create a set of common classes that are useful across a variety of common scenarios (examples include chat, presence, voice, membership, synchronization, time, etc). We will specify whether these classes will be .NET classes or C++ classes. The classes should be designed so that they can be easily composed to build more complex applications.
2. Create a set of common UI controls on top of these classes that are used by applications. Examples include a chat UI control, a presence UI control, a voice UI control, etc
3. Create new Visual Studio project types that enable rapid development of characteristic applications. The project type when chosen by the developer will be presented with the right UI controls that they can easily include in their project.

Metric for success:

Using the above components, I should be able to create a simple Peer to Peer Telephony application in 10 min or less.

Pre-requisites:

- C++ or C# (If you know Java, you'll be able to pick up C# fairly quickly)
- Networking background – CSE 422 or equivalent

Team 7. Motorola: Eclipse Plug-In for Advanced UML Code Generation

Problem

An existing 3rd party software product has been used to model hardware and software using UML. However, the 3rd party software does not contain all of the functionality that is desired to store data about the model and also does not distinguish between model specific data and user interface data. Having these two types of data not separated causes the size of the model files to be unnecessarily large.

Solution

Develop an Eclipse plug-in (or multiple plug-ins) to parse the output of the existing software product and translate into a specified format and generate Java objects. The Java objects should be represented in the Eclipse editor, separating the display specific data from the model specific data. In one view, the editor should allow the objects to be modified and stored via the editor. In another view, the editor should allow for the java objects to be selected and an instance of that object created.

Team 8. TechSmith: Web Based Video Editing

Project Description:

We would like to create a website that allows users to index and “edit” videos. Users of the website should be able to tag and bookmark specific points or segments of a video. They should also be able to create a video out of multiple video segments in a non-destructive manner.

Requirements:

This is research oriented so we aren't necessarily looking for a fully polished product.

We'd like to use Microsoft technologies for this; i.e. IIS, .NET, C# or C++, etc.

Multimedia experience (video processing) would probably be very useful.

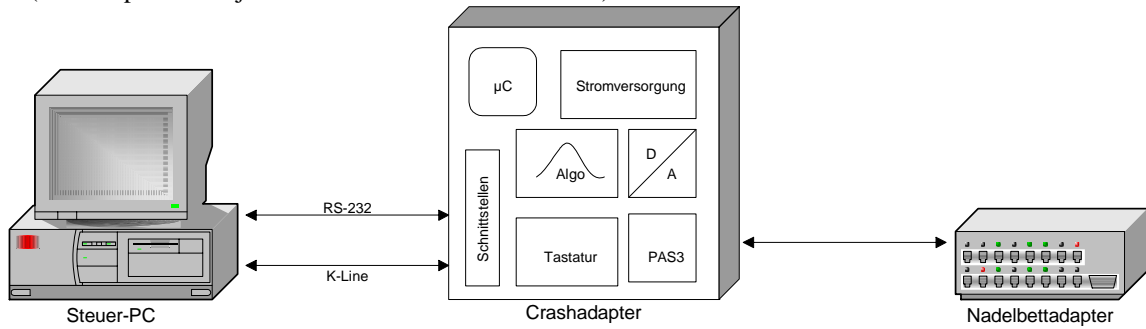
Team 9. Two Men and a Truck: Consultation Visit Reporting System

To create a Microsoft .NET system that allows field workers to complete and submit specified forms while performing a consultation. The system will use Microsoft Office InfoPath 2003 for form design and submission, and TWO MEN AND A TRUCK(r)'s existing portal system with existing web service API's for form template storage and distribution, as well as completed form storage and search. InfoPath provides off-line form completion capabilities. The team must also define a format to allow off-line access to pertinent Franchise sales and performance information to be used during the consultation.

Team 10. Union Pacific Railroad: On-Board Locomotive Wireless Network

Enhance a pre-designed wireless communications system by tweaking software and/or hardware to gain better reliability, better transfer rates, and create a better API. This communications system would be replacing a wired communication system found onboard locomotives. There are many other wireless communication paths onboard the locomotive that may interfere with the signal, not to mention a lot of RF interference from motors and other electronic components. This is a R&D project that is based off an earlier group's work.

Team 11. Continental Automotive Systems: Automotive Crash Adapter
(ECE Capstone Project with CSE Student Involvement)



The crash adaptor shall simulate the sensor signals of an airbag ECU to test the crash functions under different conditions.

It shall output sensor signals (both analog and digital) to the ECU which were previously downloaded into the crash adaptor memory. The design shall be such, that it can be used also for stand-alone mode under EMC test conditions.

Optional are the recording of data and the simulation of other peripheral interfaces.

Key features:

- Output of voltage curves to airbag ECU sensors (8 channels, analog voltage)
- Satellite sensor simulation with data output (8 channels, manchester-coded 8 bit data)
- PC software for controlling
- Automated test flow (scripts)
- Data communication with PC via optical interface
- EMC proof design
- Download of waveforms
- Optional internal battery for standalone operation
- Simulation of periphery (optional)
- Deployment detection (optional)
- Flash routines / bootloader (optional)

HW functions:

- µC system
- Optical interface
- D/A conversion
- Power supply
- EMC proof design (quasi-zero emission, high immunity)
- PAS3 interface (manchester coded, current modulated serial interface)

SW functions:

- Serial PC-interface
- Download of waveforms
- Data conversion
- Output to ADC / PAS3 interface on trigger
- Data conversion (Manchester code)
- Motorola Star12X µC required
- Possibility of control by test scripts

Tasks:

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| <ul style="list-style-type: none"> Digital design Analog design PCB design Housing design Power supply design EMC considerations |
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| <ul style="list-style-type: none"> µC programming (Star12X) Windows programming Data download Trigger functions Data conversion Memory management |
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