Team Herby

Professor Algozzine

CMPT475/477

CS/IT/IS Capstone Project

Credit Checker

# Foxify

## Introduction:

As a group we decided to name our team ‘Herby’ because it consists of the first letter from each of our last names. Our team consists or three computer science students: Charlie ropes, Jamie Engl, and Weon Yuan. We have one Information Technology major: Kevin Bruce and one information systems major: Jon Higgins. We decided to name our credit checker capstone project ‘Foxify’ because it is a transfer student credit checker to help prospective students turn into red foxes. In a sense out team is creating an end product to Foxify prospective students.

We split up the project into different roles that each person has to do to participate and to do their part in making this project come to life. Weon worked on the front end coding the graphical user interface with node.js and angular. Jamie and Charlie worked on the database and the API which communicates with and connects the front end to the backend. Kevin set up the servers and installed the operating system on them. Jon Higgins documented the weekly status reports and helped all around when needed whether it was helping with code, meeting with professors, doing research on node.js and API’s, and Linux command line commands.

## Executive summary:

Foxify is a quick and easy way to do class look-ups for prospective transfer students coming from Dutchess Community College. Students can enter their classes that they have taken at Dutchess and it will automatically show them how many credits will transfer and be accepted at Marist. They can also select what major or minor that they are interested in at Marist and it will show them what percentage they have already fulfilled with their already earned credits. This is a much more in depth report for interested students so they know what exactly they will need if they attend Marist. This will be a very fast and easy way for the admissions office to evaluate incoming transfer students instead of having to manually look up one class at a time. This will save a lot of time on both ends of the spectrum, students and Admissions office staff. Later on down the road our end product is scalable and can be updated and expanded with no problem to include more schools. In the end, more credit, look-ups can be done on a yearly basis making it easier for more students to attend Marist.

### User requirements:

Throughout the meeting with the client and the client interview our group put together an extensive set of user requirements. We selected what we thought pertained the most to what the client wanted in an end product. We did have to condense it a little because there was talk about future uses and adjustments, but we created this list based on the need of the client and excluded what we thought to be scope creep.

1.0. User Interface

1.0.1 GUI should follow standards of the physical appearance of other Marist web applications.

1.1 Web Portal for Students

1.1.1 The client is looking for a system that allows prospective transfer students the ability to compare the credits they have already taken at their current college to the classes needed for a specific major at Marist. Prospective Transfer students can only transfer in with one prospective major.

1.1.2 The tool will generate reports detailing how many credits transfer over and how many credits remain in order to graduate in the major they have selected.

1.1.3 The application will automatically let the prospective student know if they are already close to attaining a minor.(i.e. An alert that states:”You are 75% done with ‘Minor’ already.”

1.1.4.A Prospective Transfer students do not need a pathway if they have over 36 Credits.

1.1.4.B Prospective Transfer students need 24 credits to not have to do a Freshman Forum.

1.1.4.C Prospective Transfer students can only transfer in a maximum of 70 credits up to level 200 classes.

1.1.5 The system should be capable to save the classes that they have inputted under their current session, either by having the student create an account or another method.

1.1.6 Students would select classes from a previously set list specific to their school.

1.1.7 If one of their classes is not an option the student should be able to submit a request to add their class via another form to be consulted by the Admissions staff.

1.1.8 Students seeking information, which may or may not be present in the system, can request to contact the Admissions staff.

1.1.9 The tool would also record user information such as name, email, major of interest, current college, and semester they would intend to start at Marist which would be available to the Admissions staff.

1.2 Administrative Portal for Marist Admissions. 7 Admission Counselors and 10 top people that would need access.

1.2.1 The Admissions staff would be able to register an account in order to update program requirements and course equivalencies as needed.

1.2.2 The application should allow the Admissions staff to respond to open support tickets via e-mail (from students).

1.2.3 The Admissions staff should be able to review form submissions from students and have the ability to approve/reject the submissions.

1.2.4 The Admissions staff should be able to review partnership requests from Affiliate Admissions and have the ability to approve/reject the requests.

1.3 Administrative Portal for Affiliate Admissions.

1.3.1 The application should allow for other colleges and universities to apply for partnership to become an affiliate in order to be added to the tool.

1.3.2 This system will allow for Marist to develop close partnerships with numerous two-year colleges as it serves an efficient and convenient way for students looking to transfer.

## IT Requirements:

Based off the list we deducted for the user requirements our team created a list of what we needed for the IT requirements that could create and host this system based on the client’s needs.

1. **Server Platform (for each “server” required)**

Windows Server 2012 is something we can consider. It provides a secure, easy-to-manage, modular and extensible platform for reliably hosting websites, services, and applications, but we decided to go with Linux Ubuntu as the server operation system as it would work better with the database and what we are using on the front end.

## Project plan:

Team Herby created a project plan that listed dates and milestones where the group decided on realistic goals to achieve week by week. We were very strict in following this and it came out pretty well. There were a couple of set-backs when we had a connectivity issue with the API, but we quickly figured it out and steered back on track. Below is the Project plan where the group documented our goals and our progress.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Milestone** | **Tasks** | **Responsible** | **Notes** |
| 8/31/2015 | Project Start | Form team: make introductions; inventory skill strengths and weaknesses; forumulate and document initial roles and responsibilities (to be modified as needed later). | All |  |
| 8/31/2015 | Project Start | Schedule 1st team meeting - and attempt to choose recurring team meeting times that work for everyone (can be established later); establish a communications plan (ie. share emails, cell#'s, and establish how you will stay in touch) | All |  |
| 8/31/2015 | Project Start | Further develop this project plan (it is part of HW1) - THINK through your time management and what you will accomplish as the weeks progress. | All |  |
| 9/1/2015 | *Team Meeting* | *First Team Meeting. Break down Homework 1 into 4 manageable sections. As a group decide which questions need to be asked of the client at the next class. Think about project from all 3 majors point of view. Review project description and decide the user requirements. Compile into an executive summary which can be edited after meeting with client. Choose next meeting.* | All | Had first team meeting and worked on HW#1 inclduing intial setup of project plan and brainstorming for project. Sent into PM for feedback. |
| 9/4/2015 | *Team Meeting* | *Second Team Meeting. Work on Project Plan to ensure work is completed in timely fashion. Create possible deadlines for future tasks. Create two UMLs based on the two different scenerios discussed previously. IS student creates status update for the week.* | All | Received feedback from PM and created appropriate changes to HW#1 |
| 9/7/2015 | Team Meeting; 1st homework started | Have met at least once by the end of the day on 9/7; have started Homework #1 minimally - add more items to this project plan in the empty lines below and have altered this line to be something more meaninful than my babble… | All |  |
| 9/14/2015 | Homework #1 Due! | Have HW1 done; Have this project plan completely filled in for review and comments back so you will know if you have a good plan to get to end-game;   Have your client questionnaire finalized and be prepared to interview the client. | All |  |
| 9/15/2015 | *Team Meeting; Begin planning ER diagram* | *Discuss what went well with the process for Homework 1. Dicuss the answers that the client gave us from class and adjust user requirements, UML documents, and project plan as needed. Begin thinking about which tables need to be created for database.* | CS (creators) IT and IS (contributors) | Decided not to meet on this day and just meet on Friday 9/18. |
| 9/18/2015 | *Team Meeting; Work on Homework #2* | *Finalize database tables. Create Entity-Relationship diagram. Discuss different design ideas and choose the most effective one. Develop documentation for the ER diagram. IS student creates status update for the week.* | CS (creators) IT and IS (contributors) | Discussed what went well on Homework 1 (completed all goals during each meeting, had good communication with project manager). Started on homework #2 by creating the ERD. Sent to Project Manager for review. Edited and revised Hw#1. Created weekly status update. |
| 9/21/2015 | Homework #2 Due | E-R diagrams complete with supporting documentation if explanation is required for anything you document in your diagrams. | All | Homework #2 given an extention by Project Manager to Friday 9/25. Homework #3 given extension to October 25th. Addressed credit hours issue. Decided on goals for 9/22 meeting. |
| 9/22/2015 | *Team Meeting; Begin working on database design* | *Discuss what went well with the process for Homework 2. Update previous documents as needed. Discuss design for GUI/interface. Review design principles. CS students begin work on prototype of database.* | IT and IS (Wireframing) CS (database) | Updated Project Plan. Finished updating user requirements. Created additional document describeing ER diagram. Finalized ERD. IT student begame working on IT Plan. Going to start on Homework #3 on Friday 9/25. |
| 9/25/2015 | *Team Meeting; Work on Homework #3* | *Create 5 wireframes/mockups that depict design discussed in previous team meeting. Confirm with all team memebers this is the best design. CS students continue work on protoype of database. IS student creates status update for the week.* | IT and IS (Wireframing) CS (database) | Wrote create statements for tables in Database prototype. Started wireframe mockups. Continued work on IT plan. Updated Project Plan. Edited ERD. |
| 9/28/2015 | Homework #3 Due | Complete mock-ups (ie. wireframes) of your user interface. | All | Just to reiterate this due date has been pushed back to Friday 10/2. In addition Project Manager informed us that Major Concetrations are out of scope. |
| 9/29/2015 | *Team Meeting* | *Discuss what went well with the process for Homework 3. Update previous documents as needed. CS students continue work on protoype of databases. Confirm securirty permissions. IT and IS students finalize UML diagrams.* | Mostly CS students IT and IS (UML) | We as a group decided CAS was out of scope but will document it as a future opportunity. Finished wireframes. Updated project plan. Came up with activities and sent to Project Manager. |
| 10/2/2015 | *Team Meeting* | *NEW: HOMEWORK 3 DUE DATE. CS students continue work on prototype of database. Meet with SME as needed. Begin creating documentation for the database. IS student creates status update for the week.* | Mostly CS students | Finished up final wireframes after feedback from Project Manager. Decided on plan for next week. Updated Project Plan and status report. |
| 10/5/2015 | UML diags final; proj plan final | Final Project Plan - updated with all input from instructor Final UML Diagrams | All | Checked in PM to make sure project is going well. |
| 10/6/2015 | *Team Meeting* | *CS students continue work on prototype of database. Discuss stored procedures and whether or not they will be needed. Continue documenting.* | Mostly CS students | Set of local copy of postgres and ran create statements to make sure they work. Worked on GUI design on paper. Jon worked on ROI calculations. |
| 10/9/2015 | *Team Meeting* | *CS students continue work on prototype database. CS students begin work on GUI. IS and IT students help debug as needed and work on final paper. IS student creates status update for the week.* | All | Started researching new technologies such as Node.js and Express.js. Finalized some design details and updated ER diagram. |
| 10/12/2015 | Database design draft | Draft database design | CS Students | Checked in PM to make sure project in progressing accordingly. |
| 10/13/2015 | *Team Meeting* | *CS students are still working on database and GUI. IS/IT students review work of CS students and continue paper.* | All | Kevin created 3 servers, 1 for database, 1 for application, and 1 for backup. Decided on majors that are going to be used for testing and collected data accordingly. Assigned "fake" credit hours to data. |
| 10/16/2015 | *Team Meeting* | *CS students are still working on database and GUI. IS/IT students review work of CS students and continue paper. IS student creates status update for the week. Discuss what has gone well and what hasn't gone well as a team so far. Address issues as needed before peer reviews.* | All | Did not meet. Midsemester break. Weon worked on GUI. Kevin continued work on servers. |
| 10/19/2015 | Mid-semester peer reviews due | Complete initial (ie. first pass feedback) peer reviews | All | Checked in PM to make sure everything is going well. Asked for Kevin to send IT documents for initial reveiw. |
| 10/20/2015 | *Team Meeting* | *CS students still work on database and GUI. IS/IT students try using GUI and see what needs to be changed.* | All | Cancelled meeting because still waiting on client access to servers. |
| 10/23/2015 | *Team Meeting* | CS students still work on database and GUI. IS/IT students try using GUI and see what needs to be changed for easier usability. Discuss disabilities that might need special consideration for GUI such as colorblindness. IS student creates status update for the week. | All | Charlie worked on selecting and cleaning up the small portion of data we will need for testing and creating csv files. Jaime looked into postgres commands for the server to create the database and insert data. Weon continued work on GUI. Kevin working on getting NGINX onto the application server. Jon working up uploading database dump file to server. Updated documentation. |
| 10/26/2015 | Draft IT requirements, including network design | IT student discusses IT needs with CS and IS students. Begin drafting IT plan. | Mostly IT student |  |
| 10/26/2015 | *Team Meeting* | *CS students complete initial database prototype and meet with SME to discuss. CS students also continue work on GUI.IT student continues work on IT plan. IS student continues work on paper.* | All | Jaime and Charlies created database and tables on database server. Kevin showed everyone how he setup servers. Weon continued wrok on GUI. Jon began research on Node.js API. |
| 10/30/2015 | *Team Meeting* | CS students finish database prototype and documentation. IT student continues work on IT plan. IS student continues work on paper and status update for the week. | All | Jaime and Charlie created SQL files to load data into database. Kevin changed backup server into test server to test API on. Weon continued work on GUI. Jon continued learning Node js. |
| 11/2/2015 | Homework #4 Due | Database prototype complete | CS students |  |
| 11/2/2015 | Team Meeting | CS students finish work on GUI to review with whole group. IT student finished IT plan. | All | Database has enough test data in order to do simple functionality. Jon, Jaime, Charlie, and Kevin continue work on API. |
| 11/4/2015 | Team Meeting | Create Node js API. | All | Had an additional meeting because we are having trouble creating API. Tried to connect to server but had a lot of errors. Weon continued working on GUI. |
| 11/6/2015 | Team Meeting | Group meets to practice demo. | All | Still working on API and still having trouble. We are pushing off practicing demo to Sunday. |
| 11/8/2015 | Team Meeting | Finish API and practice demo. | All | Trying to get API working and practice demoing. |
| 11/9/2015 | First Demo of Prototype | Complete project prototype first-pass demo ready | All |  |
| 11/9/2015 | Team Meeting | Continue Node.js API work. | All | Met with SMEs to try and get API workng. Server having issues. Weon still worked on front end. Jaime and Charlie cotinued the API. Kevin and Jon worked on fixing up documentation. |
| 11/13/2015 | Team Meeting | Try and get Node.js API working. | All | Meeting cancelled because of school lockdown. Continued individual work. Decided to get rid of database server in order to resolve connection issues with API and server. |
| 11/16/2015 | User Validation & Test plan finalized | Test plan for all aspects of the prototype complete User validation tests to be performed by client documented |  |  |
| 11/16/2015 | Team Meeting | Test API | All | Finally got API working on application server when database was moved to that server. Jaime and Charlie sat down with Weon to go over all queries that need to be made in order for front end to function correctly. Jon and Kevin worked on documentation and setting up paper. Weon changed framework on front end from React to angular. |
| 11/20/2015 | Team Meeting | Connect Database and Front End | All | Charlie continued writing post and gets for API. Weon worked on making sessions restorable. Jon organized all current documentation for final paper. Kevin still working on documentation. Jaime updated ERD and ERD documentation along with project plan. |
| 11/23/2015 | Client Visit | Updates to user validation complete (as required) One key question to ask the client dcoumented |  | Cancelled. No meetings or class during Thanksgiving week. |
| 11/30/2015 | Draft Documentation | All documentation required for the project in Draft form |  |  |
| 12/7/2015 | Paper Due - Final Documentation | All documentation required for the project in FINAL form |  |  |
| 12/7/2015 | Final Peer Evaluations | Complete final peer evaluation forms and submit | All |  |
| 12/14/2015 | FINAL PRESENTATION! | Git er dun! | All |  |

## Weekly Status reports:

Based off of the set project plan we would closely follow or set mile stones and goals. Each week we would document our progress and any changes or challenges that we faced. We would bring the weekly status reports to the project director to report our weekly happenings.

|  |  |  |  |
| --- | --- | --- | --- |
| **Status Report - HERBY, Kevin, Jamie, Weon, Charlie, and Jon** |  |  |  |
| ***Date*** |  |  |  |
| **RGY** | **Item** | **Description** | **Mitigation / Help needed** |
| Green | Homework #1 | Created Group.We created 2 UML's and filled out the Project plan and came up with questions. We also clearly documented the set of user requirements based on the information that we have received. |  |
| Green | Homework #1 | Received feedback from Professor Algozzine. met on 9/8 and 9/11 to edit our work and submit our project. |  |
| Green | User requirements | Met with the Client and asked questions. Then on 9/15 we updated our user requirements. |  |
| Green | Homework 2, rough draft and weekly progress report due | We finished the rough Draft of our ERD, and submitted our weekly progress report. | We need help in getting and understanding exact credit hours for each class. We believe that it will be a huge issue in transfering credit hours. Also, How will the majors table transfer and seperate courses into core and elective credits. (Answered/Fixed) |
| Green | Homework #2 | Wrapped up Homework #2. Finished up Homework #2. We submitted the work and worked on the wireframe for homework #3. |  |
| Green | Homework #3 | We are continuously working on HW#3 (due October 2nd) and we have even started working on some of HW#4. The wireframing is going well and we are creating a very aesthetically and ergonomically pleasing UI for the user. | Would you like any documentation for the wireframes? If so, how would you like it presented? (answered) |
| Green | Activity Diagram | We finished exerything on HW#3, but we could not complete activity diaigram because Project Manager never contacted us about which one to do. | We are waiting on the Project Director to tell us what Activity Diagram to create.(Answered) |
| Green | Homework #4 | We have started HW#4 and work is under way. We are continuously having our meetings and doing work. IT launched a windows virtual server to begin construction of the DB. As our team still waits to hear from the P.D. we have discusses how we would create many on the different activities on an activity Diagram, but we just need the go ahead on which A.D. to create. | Currently still waiting on the word from the Project Director for the go ahead on which Activity Diagram to create.(Answered/fixed) |
| Green | Homework #4 | We have been working on the database and we have also been cleaning, and fudging the data a little. We have also been working on the GUI. | We are having issues with the data being terrible, outdated, and it not making sense, so we are fudging it a little because our client isn't able to give us more accurate/cleaner data. |
| Green | Postgress | We keep working on the database and started working on the front end and back end of the program by downloaded node and express which is nodes framework. |  |
| Green | Herby is growing | The 3 serevers are up! We have the DB sever, the front end (application server) and the backup server. We have downloaded node.js and express.js on the application server. we are also creating a dump file of the DB to throw into the DB server. | We are waiting for a responce from the project director in regards to pathways. We are having trouble using a dump file to transfer our database, so we have to type in our database into the DB server to recreate it.(Resolved) |
| Green | More Progress | We have continually been working on the front end and back end. The API has been very time consuming getting it to connect the front end and back end to gether. | We need help with the API. We have saught the help of other groups and the project director. We are continually working on everything, but we have shifted more of the focus on the API. |
| Green | Presentation | We have mad a lot of progress on both the front end and back end. The GUI is coming together very nicely and is mobile device compatible. The backend and DB are looking very god as well. | After seeking help of various professors, students, and other outside sources we are still having a diffucult time with our API. The code seems to be fine its just there is something not letting the API make the connection. We have tried many different things to get it to work, but still no connection. We are planning to meet with Chris Ahmed this week to see if he can help us solve our connection issues. |
| Green | Meeting and presentation | We did not meet on friday because we decided to cancel our meeting as the campus was on lock-down. Although we did not meet we have made progress with connection issues between the front end and back end with the API. We met with Chris Ahmed to help us fix some of the connection issues and also we sought help from Alan. | We have made an executive desicion to put the API and the DB on the Application server. We started fresh and re-installed postgres, because we believe that our issues stemed from not properly installing postgres on the DB server initially to meet our needs.Between the help from Chris Ahmed and Alan we have learned a lot and made progress with the connection. We have also had a greeat break through with the front end by not using react and anything react related. The framework was very time consuming to learn and was confusing. Instead we switched to angular.This will make course selection and filtration easier. |
| Green | no meeting with group or professor | After meeting a couple times in the previous week we decided not to meet on 11/23 because a few of the group members would already be traveling. We assigned roles for each person to work on during the week of vacation and we constatly talked and checked on each others status. | Our team telecommuted and discussed progress and each others assignments and goals for the week of break. Everyone made progress on what we were all working on and assigned. The week of the break was not a set back or a loss of time at all. Jon worked on the final paper.Kevin, worked on solidifying and editing the documentation for the paper. Jamie, worked on the database and some DB documentation. Charlie, worked on the API and the DB.Weon, kept on working on the front end and touched up on some documentation as well. |
| Yellow | Meeting with professor, status report and presentation or current work. Team meeting. | We are continually working on everything as a group and we are meeting to show what we all worked on over break and to move foreward. As we get closer to the wire we are all pushing foreward to finishing up and testing. | With much progress made over break we are meeting to help each other out and to move foreward to finishing up and then onto testing while we finish up the final documentation and brushing up the paper. |

## Cost/ROI:

**Preface-**

Throughout tracking the return on investment on this project our group has concluded that it is advantageous and profitable for Marist to back the development of this project. There are many benefits for Marist College that come from this Capstone project course.

The benefits about having this course mandatory for seniors to graduate include the following: Marist College is receiving payment for credits by students to develop this application. A Marist student pays $634 per credit hour and this is a four credit course. There are 26 people in our section and our group is assuming that the 3 sections are broken up evenly.

$634 per credit hr x 4 credits x 26 people in a section x 3 sections = **$197,808**

Marist College is roughly receiving **$197,808** from this course and receiving an application that they need to make admissions more productive when it comes to looking up transfer student credits.

**Transfer Course Look-ups-**

Currently, admissions has 5 personnel that perform 10 credit reviews each for DCC, and 90 reviews each from other colleges for a total of 100 reviews per person. Each of these reviews takes 30 minutes each.

5 people x 90 reviews + 10 DCC reviews x 30 minutes (.5 hours) = **250 hours** of time spent on look-ups.

If these reviews were not being done manually, then they could potentially be able to do 250 look-ups for DCC and 2500 reviews for other colleges a year.

250 DCC look-ups + 2500 other college look-ups = **2275 look-ups**.

This beats the:

5 people x 10 DCC look-ups + 90 look-ups = **500 look-ups** that need to be done by hand and it saves

2275 look-ups x 30 mins = **1137.5 hours** saved with an increase in the amount of look-ups by 4.5 times.

2275 number of look-ups / 500 previous number of look-ups = **4.5 times**

**Hours of production-**

Here is the production cost measured in hours that we put in of our time to produce this product:

Each class is 2.5 hours and our group meets 2 times a week for roughly 1.5 hours and we have 16 weeks/ class meetings.

2.5 hours a class x 2 meetings a week x 1.5 hours x 16 weeks x 5 people in our group = **600 hours** total that our group will spend on this project. This does not include the amount of time that we work on this project outside of class and during our meeting. Also, this doesn’t take into account if someone misses a meeting or class.

**ROI-**

ROI(%) = (Gain-Investment)\*100 / Investment

(1137.5 saved hours – 600 hours) x 100 / 600 = **89.58%**

**BEP-**

The BEP is on the 300th look-up.

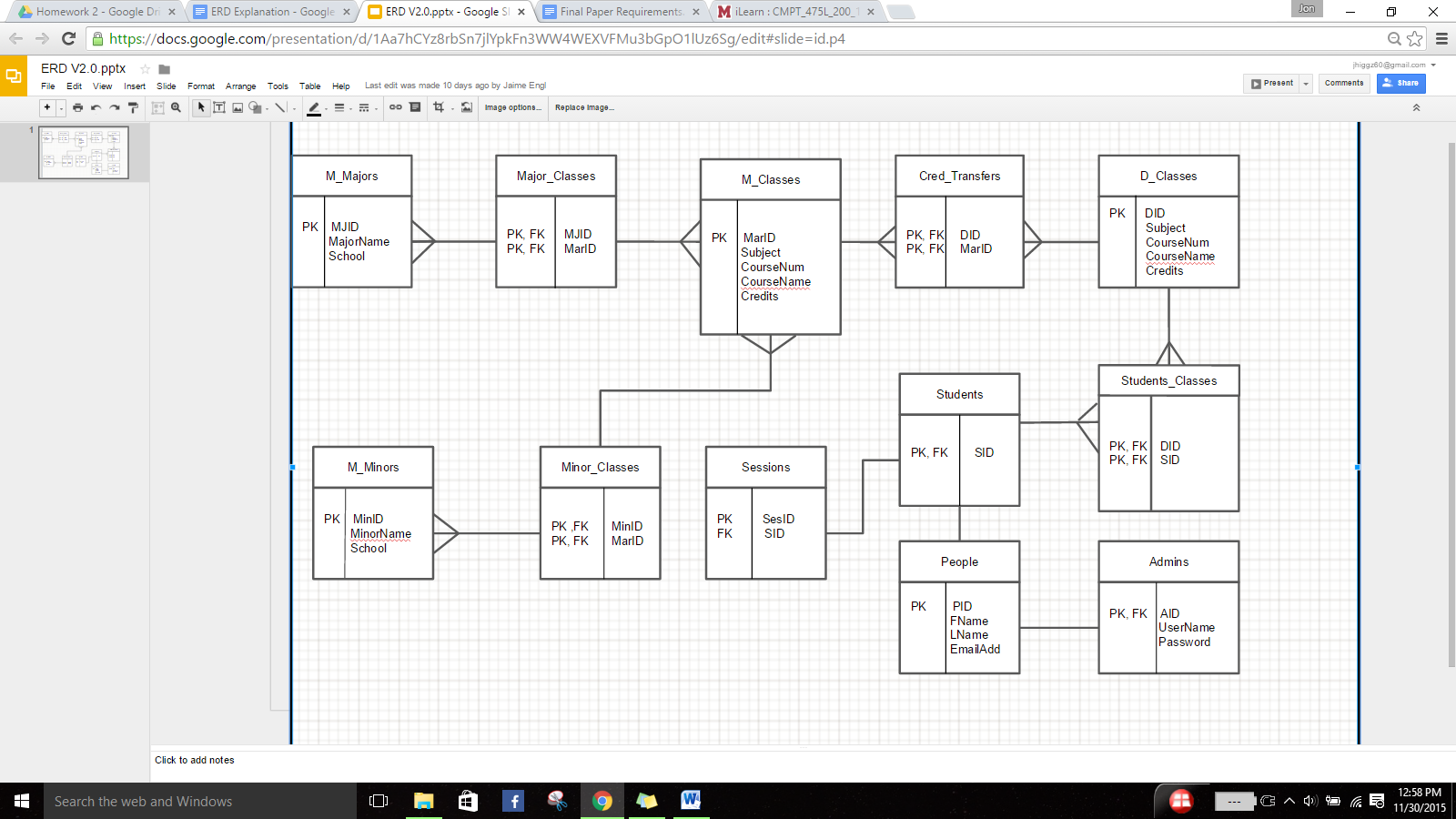
600 hours of development x .5 hours saved per look-up = **300**

And since there is an estimate that there will be 2275 look-ups a year with the implementation of the application then 300 lookups (ROI) / 2275 projected look-ups = **13%**

**Conclusion-**

I conclude that this application will be a huge benefit for the efficiency to the people in admissions to do class look-ups for prospective transfer students. Marist is guaranteed to get their ROI and BEP in the first year. Marist also is not really investing anything into the project by having a mandatory course where student create the end result. Marist is actually turning a profit with minimal investment because they are receiving money from students to take this course and the College is benefiting from the free labor. In the end Marist is receiving roughly **$197,808** off of this Capstone Project Course and by having students develop this application Marist will be saving **1137.5 hours** of work by the admissions staff and the College will gain **2275 look-ups** of interested transfer students a year.

## Application Design: ERD



**People Table**

The ***People*** table will hold basic information such as First and Last names, Email, and a PID to identify a user. It will have a one to one relationship with the ***Students*** and ***Admins*** tables.

**Admins Table**

The ***Admins*** table will hold information about the admins. It will store their Username, Password and an AID which will be taken from the ***People’s*** PID.

**Students Table**

The ***Students*** table will store only the Birthday of the student to be used to determine if prospective students will be considered a regular student or an adult student. It will also store a SID which will be taken from the ***People’s*** PID.

**Sessions Table**

In our design, we are going to have session that saves a randomly generated number with a student’s ID so they can log back into a session without losing all of the work they have done so far. The **Sessions Table** stores that generated number with the student’s email address. This table has a one to one relationship with ***Students***.

**Student\_Classes Table**

The ***Student\_Classes*** table will hold the information connecting a student to a class. This is because many classes can have many students and many student can have many classes.  This table will store the DID (Dutchess ID) with the SID (Student ID).

**D\_Classes Table**

The ***D\_Classes*** table will hold all information about Dutchess Community College courses. Subject, Credits, Course number, and Course name will all be stored along with a DID to identify classes. It will have a one to many relationship with ***Has\_Taken*** and ***Cred\_Transfers***.

**Cred\_Transfers Table**

The ***Cred\_Transfers*** tablewill hold all the information connecting a Marist class to a Dutchess Class. This will match the classes that transfer from Dutchess to Marist. This table will store DID (Dutchess ID) and MarID (Marist ID). It will act as a composite table since it has a many to one relationship with ***M\_Classes*** and ***D\_Classes***.

**M\_Classes Table**

The ***M\_Classes*** table will hold all information about Marist College courses. Subject, Course number, Credits, and Course name will all be stored along with a MarID to identify classes. It will have a one to many relationship ***Cred\_Transfers***. It also has a many to one relationship with ***M\_Minors Table*** and ***Major\_Classes Table.*** This means that a marsit course can count towards several different Majors and Minors.

**M\_Minors Table**

The ***M\_Minors Table*** will hold information about Minors at Marist. It will store the Minor name and the school the Minor belongs to. It will use a MinID to identify Minors. This table will have a many to one relationship with ***Minor\_Classes*** because a class can be part of several Minors.

**Minor\_Classes Table**

The ***Minor\_Classes*** tablewill hold information about classes that count towards specific Minors at Marist. It uses a composite key of MarID and MinID from the ***M\_Minors*** table to the ***M\_Classes*** table. The ***M\_Classes*** table has a one to many relationship with the ***M\_Minors*** table and the ***M\_Classes*** table this is because many classes can have many minors and many minors can have many classes. We need the ***Minor\_Classes*** composite table to denote this since you can not have a many to many relationship without one.

**M\_Majors Table**

The ***M\_Majors*** table will hold information about Majors at Marist. It will store the Major name and the school the Major belongs to. It will use a MJID to identify Majors. This table will have a many to one relationship with ***Major\_Classes*** because a class can be part of several Majors.

**Major\_Classes Table**

The ***Major\_Classes*** tablewill hold information about classes that count towards specific Majors at Marist. It uses a composite key of MarID and MJID from the ***M\_Majors*** table to the ***M\_Classes*** table. The ***M\_Classes*** table has a one to many relationship with the ***M\_Majors*** table and the ***M\_Classes*** table this is because many classes can have many majors and many majors can have many classes. We need the ***Major\_Classes*** composite table to denote this since you can not have a many to many relationship without one.

## User Interface Design:

**Prospective Student Login UI**

● This will be the first page Students are directed to after clicking “How will my credits transfer?” on the transfer home page.

● Students will be asked for basic information. First and Last name and their Email.

● They will hit the “Next” button and proceed to the ***Add Classes UI*** page.

**Add Classes UI**

● Students will be taken to this page from the next button on the ***Prospective Student Login UI*** page.

● Students will be asked to provide the school they are transferring credits from and the Major and possibly Minor they plan on looking up.

● Students will add classes by selecting the class subject and the class number for the class at their school.

● The “+” button will add another line for students to add classes.

● Clicking submit will bring the student to the ***Feedback UI*** page

**Feedback UI**

● After a student hits submit on the ***Add Classes UI*** page this is what their report will look like.

● Each class they entered will show the Marist equivalent or the fact that it does not transfer.

● The progress bar shows how much of the major/minor they have selected has already been completed.

**Admin Login UI**

● Admins login using a username and password.

● They will then be brought the the ***Admin Action UI***.

**Admin Action UI**

● Admins will choose either to lookup a course or edit a course.

**Admin Lookup UI**

● Admins will choose from drop down menus of subject and course number.

● Then the classes that map to that course will be listed.

**Admin Edit UI**

● The Admin can lookup a course and make changes to it such as course name, course number, credit hours, and the particular academic school of said course.

## Infrastructure Design:

The team chose to use PostgreSQL for the database for several reasons. PostgreSQL is used industry-wide and is a well known and documented. It also offers a wide variety of different data types that other databases do not for data such as IP addresses and json. Several members on the teams have worked with PostgreSQL before and were already familiar with its syntax which made for an easier integration with the application.

**Server Documentation**

Step 1: Setting up Servers on VCENTER

Download vSphere Client & Install from a web browser

Use the IP address: 10.10.7.30

Chris has the username and password for the Client. He won’t give the credential out to students.

Once we are in, we are able to view/configure servers that have been created.

As of yet nothing has been created.

Following a series of steps I was able to created and deployed a Virtual Linux Machine (Ubuntu 14.04 LTS) as the 1st Server.

Ram: 4GB

Step 2: Install Prerequisite Packages

Once the installation of the server completed, I navigated over and opened up a terminal on the Ubuntu Server.

I issued the following commands in the terminal.

sudo apt-get update – updates the repositories of the system

sudo apt-get upgrade – installs newer versions packages for the system

sudo apt-get install openssh - install ssh on the Server. This will help putty get access to  the server. I will cover this later in the documentation.

sudo apt-get install x11vnc – install vnc if we to ssh to our server with a GUI.

Step 3: Network Requirements

Once the system repositories are up to date, with the help of the Update and Upgrade commands, we can go ahead to configure and setup the network requirements for the servers. I assigned an IP address, Subnet mask, gateway, and DNS 1 & 2 to the 1st server that I created.

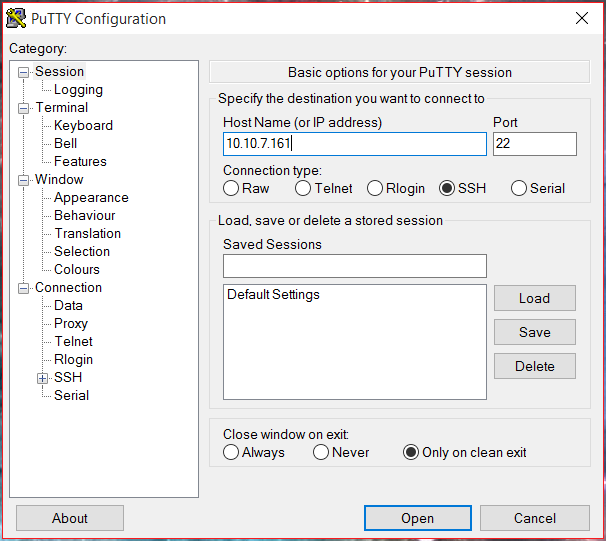
Chris cloned the server each student created into the desired number of server that each group wanted. He also gave each IT student a range of IP address they can use for their servers. range of IP addresses that was  assigned to me is 10.10.7.160 – 165. We only have Two Servers, one for the Database and application.  I chose IP address 10.10.7.161 and 162 ans assigned it to the 2 Servers.

After getting the server configured and running, Chris cloned 2 more Servers, an Application server and a backup server. The IP address changes for the 2 new servers, but the rest of the network requirements information stays the same.

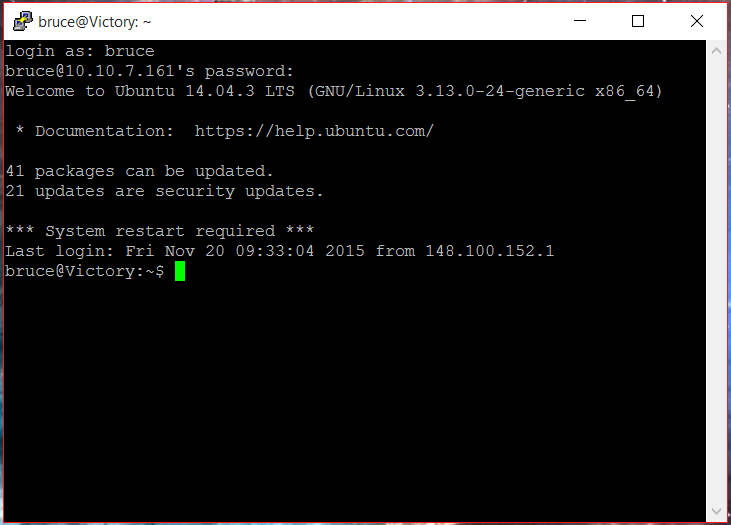
Server 1 (**Database**) (**Application**) has an IP address: 10.10.7.161, Subnet Mask: 255.255.255.0, Gateway: 10.10.7.1, DNS 10.12.1.11, DNS 10.12.1.12.

Server 2 (**Backup**) has an IP address: 10.10.7.162, Subnet Mask: 255.255.255.0, Gateway: 10.10.7.1, DNS 10.12.1.11, DNS 10.12.1.12.

Step 6: Install Putty on PC

I had to install Putty on my personal machine. Putty is a program that helps a user get access to an operating system (OS) they created through a command-line interface terminal. They can do so with the help from the IP address assigned to the OS, and default port of 22.  

Putty will then open up a command-line interface terminal that will ask for a username and password that was setup at the beginning of the creation of the server. Once the user inputs this information they will be granted access to the servers terminal.



(10.10.7.161)

**Database Server**

Step 1: Install PostgreSQL

**(PostgreSQl is an open source relational database management system.)**

The following commands will install PostgreSQL on the server. I did this to each server.

Ensuring the list of available packages is up to date before installing anything new.

apt-get -y update

Then it’s a matter of just running one command for installation via apt-get:

apt-get -y install postgresql postgresql-contrib

Let’s switch into that system user:

su – postgres

And then connect to the PostgreSQL terminal (in the postgres role):

psql

To get out of the PostgreSQl terminal

\q

https://www.digitalocean.com/community/tutorials/how-to-install-and-use-postgresql-on-ubuntu-14-04

Step 2: Install Git

**(Git is an open source controlled system designed to handle small to larger projects.)**

The following commands will install Git on the server. I did this to each server.

Ensuring the list of available packages is up to date before installing anything new.

sudo apt-get update

sudo apt-get install build-essential libssl-dev libcurl4-gnutls-dev libexpat1-dev gettext unzip

Back on your Ubuntu 14.04 server, you can type wget and follow it by pasting the address you copied.

The URL that you copied may be different from mine:

wget https://github.com/weonyuan/Herby/archive/master.zip -o git.zip

Unzip the file that you downloaded and move into the resulting directory by typing:

unzip git .zip

cd git-\*

Now, you can make the package and install it by typing these two commands:

make prefix=/user/local all

sudo make prefix=/usr/local install

Now that you have git installed, if you want to upgrade to a later version, you can simply clone the repository and then build and install:

git clone github-windows://openRepo/https://github.com/weonyuan/Herby

This will create a new directory within your current directory where you can rebuild the package and reinstall the newer version, just like you did above. This will overwrite your older version with the new version:

make prefix=/user/local all

sudo make prefix=/usr/local install

How To SetUp Git

git config –-global user.name “Your Name”

git config –-global user.name “youremail@domain.com”

We can see all of the configuration items that have been set by typing:

git config –-list

**git configuration**

**user.name=Your Name**

**user.email=youremail@domain.com**

As you can see, this has a slightly different format. The information is stored in the configuration file, which you can optionally edit by hand with your text editor like this:

Nano ~/.gitconfig

**~/.gitconfig contents**

**[user]**

**name = Your Name**

**email = youremail@domain.com**

<https://www.digitalocean.com/community/tutorials/how-to-install-git-on-ubuntu-14-04>

**Application Server**

Step 1: Install Node

**(Node.js is a Javascript platform for server-side programming that allows users to build network applications quickly.)**

sudo apt-get update  
sudo apt-get install nodejs

sudo apt-get install npm

Step 2: Install Nginx

**(Nginx is a Web Server that is great with performance and low memory usage.)**

Since this is our first interaction with the apt packaging system in this session, we should update our local package index before we begin so that we are using the most up-to-date information. Afterwards, we will install nginx:

sudo apt-get update  
sudo apt-get install nginx

Start Nginx Service

sudo service nginx start

Step 3: Install Curl

**(Curl is a command line tool for transferring data with URL syntax.)**

You can access the default Nginx landing page to confirm that the software is running properly by visiting your server's domain name or public IP address in your web browser, but first we have to install curl.

sudo apt-get install curl

<https://www.digitalocean.com/community/tutorials/how-to-install-nginx-on-ubuntu-14-04-lts>

Step 3: Check / Connect to Nginx on the Web

Enter the following commands

**ip addr show eth0 | grep inet | awk '{ print $2; }' | sed 's/\/.\*$//'**

**curl http://icanhazip.com**

**When you have your Server's IP address or domain, enter it into your browser's address bar:**

**http://10.10.7.161**

Stop Nginx Service

sudo service nginx stop

We can make sure that our web server will restart automatically when the server is rebooted by typing:

sudo update-rc.d nginx defaults

This should already be enabled by default, so you may see a message like this:

System start/stop links for /etc/init.d/nginx already exist.

https://www.digitalocean.com/community/tutorials/how-to-install-nginx-on-ubuntu-14-04-lts

(10.10.7.162)

**Backup Server**

Step 1: Install RSnapShots

sudo apt-get update  
sudo apt-get install rsnapshots

In order to backup another server, your backup server will need to be able to connect through SSH to the server you wish to back up

To generate a public and private key run this command on your backup server:

sudo ssh-keygen -t rsa

We need to make sure we can SSH to another server from the Backup Server.

**sudo apt-get install sshpass**

**sshpass -p password ssh bruce@10.10.7.161**

**exit**

Step 2: Configuring RSnapShots

After you have installed rsnapshot, you will need to edit the configuration file.

sudo nano /etc/rsnapshot.conf

Once in the configuration file you can move up with F7 and down with F8. Find the variable for each directory and make sure it corresponds to what’s below, if not edit it to match the variables.

**snapshot\_root /backup/**

**cmd\_ssh /usr/bin/ssh**

**cmd\_du /usr/bin/du**

We set these up under the “BACKUP INTERVALS” section of the configuration.

**#########################################  
#           BACKUP INTERVALS            #  
# Must be unique and in ascending order #  
# i.e. hourly, daily, weekly, etc.      #  
#########################################  
  
retain hourly  6  
retain daily   7  
retain weekly  4  
retain monthly 3**

Another item that may need to be edited is the ssh\_args variable and backup home directory. **ssh\_args -p 25000**

**backup /home/ localhost/  
backup /etc/ localhost/**

**backup bruce@10.10.7.161:/home/ remote-droplet/**

Step 3: Testing the Configuration

sudo rsnapshot configtest

Enter the commands below to set when you want to backup snapshot to be taken.

sudo rsnapshot -t daily

sudo rsnapshot daily

Step 4: Automating the Process

sudo nano /etc/cron.d/rsnapshot

We’re going to remove the “#” character from the beginning of the scheduling section to activate these values.

**# This is a sample cron file for rsnapshot.  
# The values used correspond to the examples in /etc/rsnapshot.conf.  
# There you can also set the backup points and many other things.  
#  
# To activate this cron file you have to uncomment the lines below.  
# Feel free to adapt it to your needs.  
  
0 \*/4            \* \* \*           root    /usr/bin/rsnapshot hourly  
30 3          \* \* \*           root    /usr/bin/rsnapshot daily  
0  3            \* \* 1           root    /usr/bin/rsnapshot weekly  
30 2            1 \* \*           root    /usr/bin/rsnapshot monthly**

These settings will run add a snapshot to the “hourly” directory within our “/backup/” directory every four hours, add a daily snapshot everyday at 3:30 am, add a “weekly” snapshot every Monday at 3:00 am, and add a “monthly” snapshot on the first of every month at 2:30 am.

Step 5: Restoring the files from the Backup Server

Login to Backup.nixcraft.net.in, enter:

# ssh user@backup.nixcraft.net.in

Cd to your rsnapshot directory:

# cd /.raid/rsnapshot

To list current snapshots, enter:

# ls -l

The daily backups for server1 is stored at /.raid/rsnapshot/daily.\*/server1/ directory. To see latest daily backup (daily.0), enter:

You can restore backups to server1 using the rsync as follows to restore /var/www/html/:

# cd /.raid/rsnapshot/daily.0/server1/var/www/html/

# rsync -avr \* [user@server1.nixcraft.net.in](mailto:user@server1.nixcraft.net.in):/var/www/html/

OR use the scp command to copy selected file such as /var/www/html/db.conf.php: