Graduation Progress Tool - Enhancing the portal of North Carolina State University

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Abstract

The web portal technology is way to help curb one of the university's principal managerial operations: Students academic management. The informative features and usefulness of the web portal system has not encouraged the students usability behaviour due to the portals inability to effectively and satisfactorily achieve a range of specified or completed tasks irrespective of their competences. Three solutions are proposed to help the students to keep better track of their courses. In this paper, all the solutions are evaluated and future enhancements are proposed for each solution.

1 Introduction

Many Universities have started initiatives on using the web Portal technology as an information management tool to deliver education to students. North Carolina State University uses the mypack portal to keep track of the courses of a particular student. The portal allows the student to search and register for courses and get their grades of each course. The student is enrolled in the courses if there is no error while the shopping cart is submitted, the listed courses are all successfully enrolled. One can drop selected courses from the enrolled list and also swap one of the courses with another selected course.

The To Do list gives the catalog of all the required steps to taken for the major or courses registered.All graduate students can fill out their plan of work and Advisory Committee online through the Student Self Service in mypack Portal.

1.1 Problem Statement

The current portal give the students a way to choose courses they have pre planned for the semester, giving them ease to add and drop courses at their ease. But there are certain requirements to be met before a student can graduate. Lot of factors play role while coming up with a graduation plan. Students should keep all these factors in mind while selecting courses for the semester. But as these factors are large in number and varied in nature, this becomes a cumbersome task. Certain courses are core subjects which have to be taken for graduating. In addition a graduate student has to attend a specific number of lectures for successfully graduating. The current mypack portal does not keep track of these details. A student has to track his progress on his own. The portal fails to provide a way for the students to follow up on all their requirements in the same place. We have proposed three solutions that will give the students an easier way to track their progress so that they are clear on the requirements for graduation.

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1.2 Proposed solutions

We have come up with three solutions to ease the students trackings. The first solution acts as a personal aid for an individual student to be able to keep note on the core courses taken and lectures attended. The student can now know how many more credits he is yet to take along with the current state of progress. The second solution requires the student to enter the current credential status and the courses taken until now. The application stores these details and helps the student to track his graduation journey and update his status whenever a progress is made. The third solution mirrors the existent mypack portal. The details of the student are taken from the portal and the courses are arranged in a detailed manner based on the requirements for graduation. So the student knows his current status by logging into the portal alone.

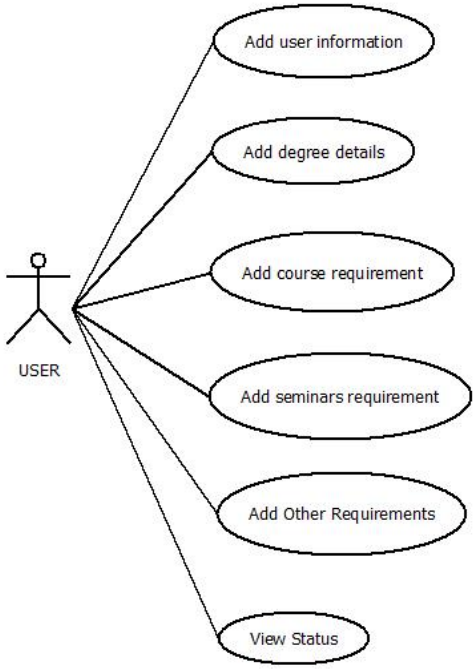
2 Solution 1: Grad Planner Lite

2.1 Basic idea

A major part of planning ones graduation involves identifying the requirements to be met in order to graduate and keeping track of them. The requirements to be met varies from individual to individual based on the degree or major the person wants to pursue. The Grad Planner Lite is a very simple and elegant solution to address this task. It is a mobile application, where the user can list different requirements (course requirement, seminar requirement etc.) to be met and keep track of it.

The Grad Planner Lite requires some initial effort at the users end. The user has to first decide which courses to enroll for, how many seminars to attend etc. and feed the tool with his intentions. The user can avail this information from the department web pages and irrespective of any tool in place the user will have to go through these web pages at least once. Once the user has decided what to do he can record this information in Grad Planner Lite. Now as the graduate studies progress, user can mark these requirements as met, remove them, add new requirements or at any time see how many requirements are pending.

Figure 1: **Use Case Diagram for Solution 1**



2.2 Usage of the Solution

Grad Planner Lite is deployed as an Android application. It helps the user to check at any time to see if any requirements are pending without even having an internet connection. Even though the user has to take some initial effort to figure out the requirements to meet in order to graduate it is probably a one-time effort because requirements do not change frequently. It makes change management so easy. The user can easily add new requirements, edit/ remove existing requirements. One can draw an analogy of this tool to a to-do list or a Kanban board for graduation. It helps you figure out if you are in track and you do not miss anything.

2.3 Future Enhancements

There is lot of scope for future enhancement to this application without affecting the benefits. One would be, based on the major/ specialization of the user provide the list of mandatory courses and required number of seminars. Now even though we are capturing the major of the user, the information is not used. This would be a fairly simple improvement with very good impact.

3 Solution 2: Grad Tracker Tool

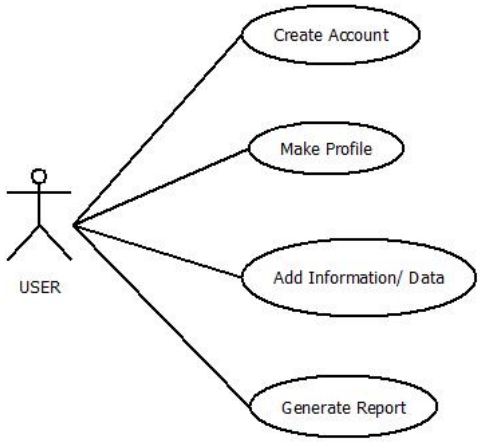
3.1 Basic idea

The basic idea or thinking behind the Graduation Tracker Tool is to provide user with a seamless and comprehensive tool that can help him or her to keep track of the progress made towards the goal of graduation. We opted for a desktop application as the data could be kept persistent and it can be optimized for personalized use of the owner who installs the application.

This application can be distributed as exe for windows users or as a dmg file for mac. The application maintains the database that is a repository where requirements data for different streams is maintained. This data can be updated by providing user new patches or updates for the application or this application can obtain a connection to my pack portal if required permissions are provided to keep the database in sync with the changes introduced in the requirements or if a new requirement is introduced at later stage.

The application requires each user to create account and login using the same credentials in future. The aim of the tool is to let user maintain different profiles and track their progress in terms of seminars taken, core requirements completed and other pre-requisites of the graduation process. The desktop application can be enhanced to generate notification or calendar reminder regarding the approaching deadlines and enrollment dates. This application is beneficial as it just not help user keep track of the requirements but also notifies or provide feedback on the future actions required on part of user.

Figure 2: **Use Case Diagram for Solution 2**



3.2 Technical details

Graduation tracker tool desktop application is GWT (Google Web Toolkit) based application. GWT is a Google Web development toolkit for building and optimizing complex browser-based applications. Many products at Google, including AdWords, AdSense, Flights, Hotel Finder, Wallet and Blogger, use GWT. It is open source and used by thousands of developers around the world. We have used jetty server to host the application. My SQL database is used at backend to maintain the table of user credentials and requirement data for different streams. Application follows MVC architecture with well-defined segregation between the three layers.

Database layer contains interfaces for the login and DB query module. The login module utilizes jbcrypt for hashing the passwords and storing hashed values in the database. The user interface is designed using html and css in addition to the javascript code generated using GWT.

GWT contains two powerful tools for creating optimized web applications. The GWT compiler performs comprehensive optimization across codebase.

Performance bottlenecks arent limited to JavaScript. Browser layout and CSS often behave in strange ways that are hard to diagnose. Speed tracer is a new Chrome Extension in GWT that makes it possible to diagnose performance problems in the browser. Server side is coded in java. Client obtains the handle for the service implemented on server side by making an asynchronous call to the service.

The overall design of the application is developed keeping in mind the extensibility and modularity. The application is flexible enough to introduce new features without changing the existing design and interfaces.

3.3 Future Enhancements

As the application is build using MVC architecture and maintains well-defined interfaces there is a lot of scope for further enhancements as well as it is flexible enough for changing the user interface or the database schema lying beneath. One of the features that can be added to the application is notification system discussed briefly in prior section. Apart from desktop alerts a mail server can be configured that can send mail to the registered email id that contains the graduation plan or the approaching deadlines for enrolling in a subject. The other feature can be the alert service, which send mobile message or mail alert to the user when a seat or waiting list of a subject gets clear for a course that user added in his or her wish list.

From the technical aspect many improvements can be made to the UI to make it more interactive and user friendly. As we discovered during the evaluation of the application the major user base is very use to using mypack and prefer similar interface. Thus the major enhancement for this application can be on the user interface side making the look and feel same as the solution 3 that our audience liked much better. We can also enable https and ssl connection to enhance the security of the application and keeping the user credentials safe while in transit.

4 Solution 3: Grad Portal

4.1 Basic idea

Solution 3 aimed at modifying the existing tool "mypack portal" to make it more user friendly. We took the following approach a. Instead of having the relevant information scattered, having all the links/ information within one page. These links could be organized according to relevance, i.e. for a first time unity id user helping them understand the concepts of core requirements, requirements of graduating a degree in terms of gpa or taking subjects, pursuing special tracks to get certificates other than the degree; and so on.

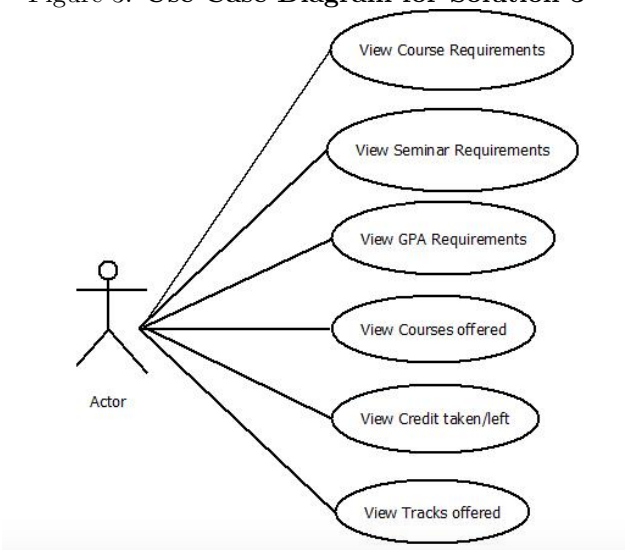
For modifying the existing tool my pack portal, one of the major challenge was to get its code base or to code the existing tool first and then work on it to modify how things are displayed. Furthermore, it was also noted that mypack tool is not just a tool to display and store grades of students but also is used for various other functions including but not limited to: applying for courses, graduation, campus housing, taxe details, student employment.

For this solution in particular, it was decided to mock the behavior of the existing tool and focussed on the area which catered to the problem statement of this project. In order to achieve so we mocked the behavior storing current subjects enrolled, past enrollments, grades for past enrollments and GPA so far by taking this information from the user by making them fill a form. They are then directed to a page which displays in a tabbed format. Currently the solution is targeting the Computer Science Graduates and displays all the theory, systems and advance alternative core courses requirements, it also displays max. Requirements, subjects takes. Legends are given to explain the color scheme at the bottom of the page, i.e. for core core courses taken color green and for subjects offered this sem color blue. This solution focussed on making the information available not just in consolidated way but also having colors associated reduced the time taken by the user to comprehend their requirements vs what they have taken and plan to take up next. Furthermore, there are tabs like

- Data Science Track tab
- Software Engineering track tab
- GPA requirements
- Seminar requirements
- Graduation checklist

Each of these tabs have respective websites, links to the calendar to make it easier to go through.

Figure 3: **Use Case Diagram for Solution 3**



4.2 Technical aspects

Basic html pages with css and javascript is used to populate the mypack portal with the subjects taken, offered, credit details; achieve.

4.3 Future enhancements

Currently the solution only focuses on the csc grad students. We can extend it to include other majors like Computer Science (CS),Computer Network (CN), Electronics and Communication Engineering (ECE), etc. Secondly, the solution is only focusing on providing visual courses to the student about which courses

5 Evaluation Plan

5.1 Methodology

Our approach towards evaluating all three solutions was by conducting a study where participants familiar with the mypack portal were made to use all the three solutions and were asked to do certain tasks. We made the user use one solution at a time and asked them to fill the survey with respect to that particular solution. And this task was repeated for all the three solutions. We did not want the user to be biased by the order in which they were asked to work on solutions; i.e. not think that if Use r1 is asked to work on Solution 1, Solution 2 and Solution 3,say, Solution 2 is the best and Solution 3 least effective or any such order. In order to avoid such bias, we tried to randomize the order in which each participant worked on a solution. The survey consisted of questions around the usability of each of the solution to perform a task like figuring the theory requirements, seminar requirements, etc.

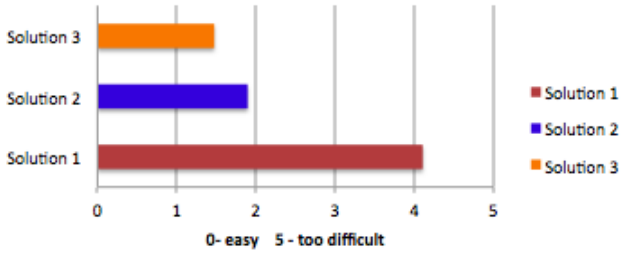
5.2 Participants

We approached 20 North Carolina State University(NCSU) Computer Science Graduates currently enrolled. The participants were aged between 23-31 and there was a mix of 2nd semester and 4 semester students(i.e. 12 second semester students, and eight 4 semester students). It should be noted that the users were already familiar with the mypack portal. We further divided these 20 participants randomly into 4 user groups of 5 participants each. Furthermore, we divided the user group among ourselves, taking one user group each.

6 Survey Results

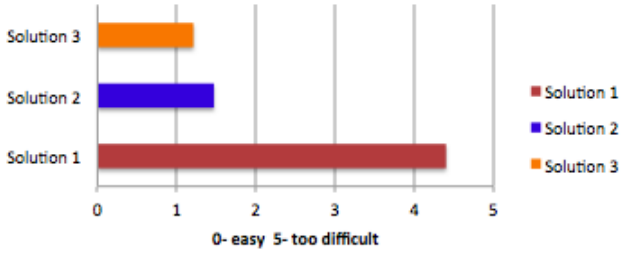
In this section we have presented evaluation participants reaction to some of the important questions in survey. These graphs provide an insight to why one of the solution performed better than the others in particular domain. Studying and analyzing these responses and graphs we have concluded our findings about the three solutions in the final section.

Figure 4: **Ability to extract Graduation Requirements**



One of the key aspect for evaluating any of the three solutions is the ability of the application to extract graduation requirements quickly and easily. The problem most users face with the current portal is that information is scattered over large number of pages and thus users are not able to access the whole picture at one place. As it can be seen from the the Figure 4, Solution 2 and 3 performed much better in this evaluation metric but the solution 1 lagged behind. This was expected behaviour as the solution 1 was developed and designed just as TODO or Checklist functionality.

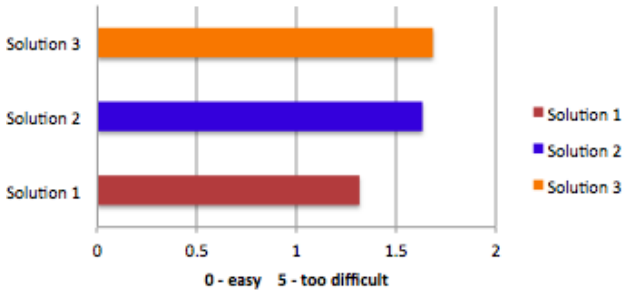
Figure 5: **Track Seminars attended, theory and System courses taken**



Certain degree programs requires the students to attend academic seminars. Hence, it is important to keep track of seminar attendance. According to the survey result all the solutions captures the seminar attendance information well.

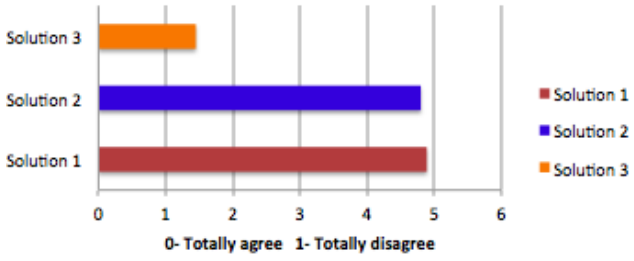
For majors like Computer Science the students are also required to enroll for both Theory and System courses. According to the survey even though Solution 2 and Solution 3 does a good job of capturing this information, Solution 1 does not distinguish between Theory and System courses.

Figure 6: **Ease of Usage**



One important factor to be considered while designing any tool is to ensure that it provides the user a comfortable and easy way to use the tool. A tool which has a good interface quality is preferred over an overly complex one.According to the survey results in Figure 6, we conducted, we learned that in general the users are comfortable in using all of our Solutions.

Figure 7: **Gives a clear idea of courses offered in the semester**



We asked the users to try to find out the courses that were being offered in a particular solution, and asked them to then answer the survey question if they were able to successfully do the same on a scale of 0 (totally agree) to 5 (totally disagree). From figure 7 it can be observed that most participants could easily find the courses offered in solution 3 vs the other two solutions.

6.1 Study of the survey results

- **Solution 1:** The primary motivation behind Solution 1 was to have something very simple, easy to use and intuitive. It acts like a TODO list which helps the user to identify if he/ she is in track or not. However, there is a lot of scope for improvement. For instance, if the Solution can provide the user with the course requirement based on the major/ specialization , it will reduce the effort at the users end. Nevertheless it is useful to have such a lightweight application in your mobile device.

- **Solution 2:** Solution 2 started as a frontrunner in our opinion when we initially started the design and development phase. But after completing the evaluation we realized there are some inherited drawbacks in the solution. One of the major shortcoming is that user needs to add all the information himself or herself and data is not fetched from mypack profile. Another shortcoming is lack of suggestions made for a user regarding courses that he or she should take in coming semesters. The last and the most important drawback was lack of visual cues or User Interface was not that expressive and aligned to mypack and thus users face difficulties while using the tool.

  Solution 2 excelled in case of usability as it is really easy to install and use. Users feedback confirmed that graduation tracker tool is a step in right direction but there are lot of areas in which it can be improved.

- **Solution 3:** During the design phase, Solution 3 (enhancing the current portal) seemed to be the least impacting solution to the current problem. Analyzing the initial surveys it was clear that users have trouble using and navigating through the existing portal. This was a major reasons of us thinking that enhancements to the existing portal might not have a very huge impact. Observing the surveys that we conducted after showing them the three working solutions, we can see that solution 3 stands out. One of the reasons could be the familiarity aspect, the participants seemed more comfortable with the solution 3 as they could relate more to the existing portal.

  Another and one of the major reasons being that solution 3 is easy to use and understand. The focus on this solution was mainly on the interface being better than the existing one, having more visual cues and putting less cognitional burden. For e.g. the use of colors to describe which subjects are offered in a semester and also providing the legends; reducing the amount of navigation required to get a particular information in the existing tool.

7 Conclusion

The surveys conducted on 20 participants presented in this paper shows that solution 3 was more prefered over the other two solutions. As explored in length in these surveys, although all the solutions were easy to use, some of the tasks could be done more easily on one solution than others. Furthermore, solution 3s familiarity with the current portal made the participants prefer it more. It should be noted that the solution 3 aimed at providing visual clues which helped in reducing users cognitive burden thus making it more appealing to the users than the other solutions.

References

[1] GIThub repository, `https://github.com/jordy-jose/CSC_510_group_d`

[2] Initial proposal and Surveys, `http://bit.ly/1KQyuKA`

[3] Mypack Portal of NCSU, `www.mypack.ncsu.edu` *Student portal*