Enigma Software Engineers

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Problem Definition

Information management and dissemination is an important issue for all businesses and organisations alike. The World Wide Web has revolutionised how information is managed and distributed by providing an online web based application to share information. All large organisations are or have already taken advantage of this, but it is often the case that many small organisations lack the finances and technical expertise to explore this avenue of communication and information management.

Small enterprises are such organisations that lack the necessary resources to establish and maintain a web presence. Kanukapo Investment CC is just one organisation that currently has no web presence, but would relish the opportunity to disseminate information to its current learners/students and prospective students on-line. Kanukapo Investment CC, is a college that offer tutorials in several subjects such as Business Accounting, Entrepreneurship, Economics and Business Studies to the current grade 10's and 12's including the part time learners. Kanukapo also help tertiary students majoring in Economics and Intermediate Micro and Macroeconomics.

Kanukapo Investment CC is experiencing difficulties in advertising the services they offer to the community. It is therefore believed that a web application would improve the advertisement process and enable the college to carry out other administrative tasks interactively online.

Scope

This web site is being developed for college and is intended to be used by individuals with wed access.

Feasibility study

The purpose of the web page we will be designing is to provide students, parents, administration, and the community information about the Kanukapo Investment CC. Communication between parents and the school is vital for the education of their children, and we want parents to know the resources available to their children while they are enrolling at Kanukapo. Also, students would benefit from having one place to go to learn Kanukapo Investment CC procedures, find the online databases provided by the school district, and receive homework help. One of the most confusing aspects of writing papers is the citing of resources used for the paper. Included in the web page will be the basic information students will need to cite sources. The site will serve as a one-stop resource for Kanukapo Investment CC.

To determine the need for web site we met up with our client, to find out his information needs and what he would like this web site to offer. We also asked our client how the web site should look like and how it will support him and then he expressed a need for resources that the students and prospective students could access for help with homework and enrolment. He also would like to let the community and students to know basic information such as how to contact the school and when the school is open. Furthermore, he stated that tutors at Kanukapo Investment CC, would want easy access to database and other resources

that would help students research and write. He also asked for a web site that would be easy to navigate with links that would help with homework and writing. Information included and how it meets the goal of the web site.

Anyone who browses this site will be able to find the following:

- Information about the Kanukapo Investment CC
- Procedures used at the Kanukapo Investment CC
- Staff and hours of operation of Kanukapo Investment CC
- E-mail address of Kanukapo Investment CC
- How to follow them on social media channels like twitter and Facebook.

Providing this information will meet the goal of serving as a one-stop source of information for the students of high school and provide information about Kanukapo Investment CC to the community.

Presentation/Organisation of the project

The home page will set the look of the website. Each of the following three pages will have the same title and logo as the home page to start the page at the top. A horizontal navigation bar under this graphic will be used on each page with links to the other web pages. A table on the initial page will give the address of Kanukapo Investment CC, the mission statement, and other basic information about the college. Information about the author of the web site and e-mail address will be given on the home page. The overall structure of the web site will be hierarchical in nature. The home page will be the starting point. On this page will be links to the information page, resource page, enrolment page and how to cite source page. We would make the presentation and organization to be easy to understand and easy to navigate. A link to the home page and contact information will also be at the bottom of all pages.

Colour scheme for this web site should promote a professional appearance and be designed to support user navigation and understanding of the presented information. We will use a tan background for all pages with a consistent header on each page that includes a graphic that is a symbol of Kanukapo Investment CC. the graphic will incorporate browns and blues that complement the background. Text will be black with blue links. Visited links will appear as brown. All clip art will visually integrate with the web page and will complement it. If needed, we will use a paint program to recolour clip art that clashes with the page.

Identify the requirements

A detailed study of the needs of the user is critical to the success of any development project. Understanding the business processes is essential to acquiring these needs. It is important to ensure a development incorporates not just the current practices but any desired or future expansion of the college needs. To collect these requirements, meetings were held with our client. Hence, it is important at this stage not only to determine and understand the functions an IT system must fulfil but to establish exactly which functions will determine whether the system is successful.

To identify all the requirements, we included all functional and non-functional requirements for our system, the data that the system will need to manage, interfaces to other systems and interfaces of different classes of users. This includes our website interface design.

- Website design
- Website features
- Website layout
- Search engine optimization strategy

Functional requirements

- The ability to inform members of important notices including upcoming events.
- The ability to store and maintain current and past question papers and other related information.
- The ability to store and maintain student's profiles including contact details, such home address etc.
- The web application shall accept students/ learners enrolment/registration.
- The web application shall produce a receipt detailing a student's enrolment.
- The web application shall be able to provide notes online.

Non-functional requirements

- Response time and reliability.
- The web application shall be easy to use by both the tutors, customers (learners and students) etc.
- The web application will allow several booking at a time without downgrading its performance.
- Non-functional requirements.
- If unable to process the request then appropriate error message should be displayed.
- The details need to be maintained properly.
- Users must be authenticated.
- The database must be kept backed up.
- To enter into this site, user has to register himself first. Requirements of registration are first name, last name, user name, email-id, password, confirm password etc.
- The system will provide facility to login into the system.
- After entering the password and user id the users can access their profiles.
- The details of the user must be safe and secure.

The application's target audience:

- Employees of the company (tutors)
- Learners and students
- Accreditation agencies, if any
- Partners

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- Media: Kanukapo Investment CC have been featured in a variety of local magazines and other medias, they would like the website to attract further students and enable interested parties to enrol easily.

Navigation structure

To design a clear and simple navigation system, we came up with three questions that should be answered by a good navigation system:

1. Where am I?
2. Where have I been?
3. Where can I go?

Our site's navigation system will answer all three questions if we include these basic elements:

- **Keep it consistent:** The navigation system should be in the same place on every page and have the same format. Visitors will get confused and frustrated if links appear and disappear unpredictably. So we considered using dynamic design in our navigation system to make certain the navigation system stays consistent

- **Use appropriate text inside links:** Don't make your visitors guess where a link is going to take them. Visitors should be able to anticipate a link's destination by reading the text in the link or on the navigation button. This isn't the time to be cute or obscure - visitors don't have the time or patience for it. If there's any question about a link's destination, clarify the issue with a TITLE attribute that explains exactly where the link goes.

- **Include a home page link inside your main navigation system:** Visitors may enter your site via an internal page, but hopefully they'll want to head for the home page next.

- **Site logo links to home page:** Most sites include their logo somewhere at the top of every page - generally in the top, left-hand corner. Visitors expect this logo to be a link to your site's home page. They'll often go there before looking for the home link in the navigation system.

- **Include a site search box:** A robust site search feature helps visitors quickly locate the information they want. We made the search box prominent and ensured that it searches all the information needed

- **Keep the content clear and simple:** You may attract visitors with an eye-catching design, but content is what keeps them at the site and encourages them to return.

Keeping search engines in mind when we were writing the content, we remembered that your ultimate audience is human visitors, so we presented the content with humans in mind as we identified the following the points:

- **Don't save the best for last:** We placed most important content high on the page. Think of a newspaper: the top story is always prominently displayed above the fold. During the design we checked the page display in a number of different screen

resolutions to make sure that the most important content is visible when the page loads.

Make page content easy to scan: You'll spend hours - maybe days - writing your page content and it's really annoying to think that visitors may read less than half of it. So we tried to format the content so that it's easy to scan by emphasizing important points with a combination of header tags, bold type, colour, or lists.

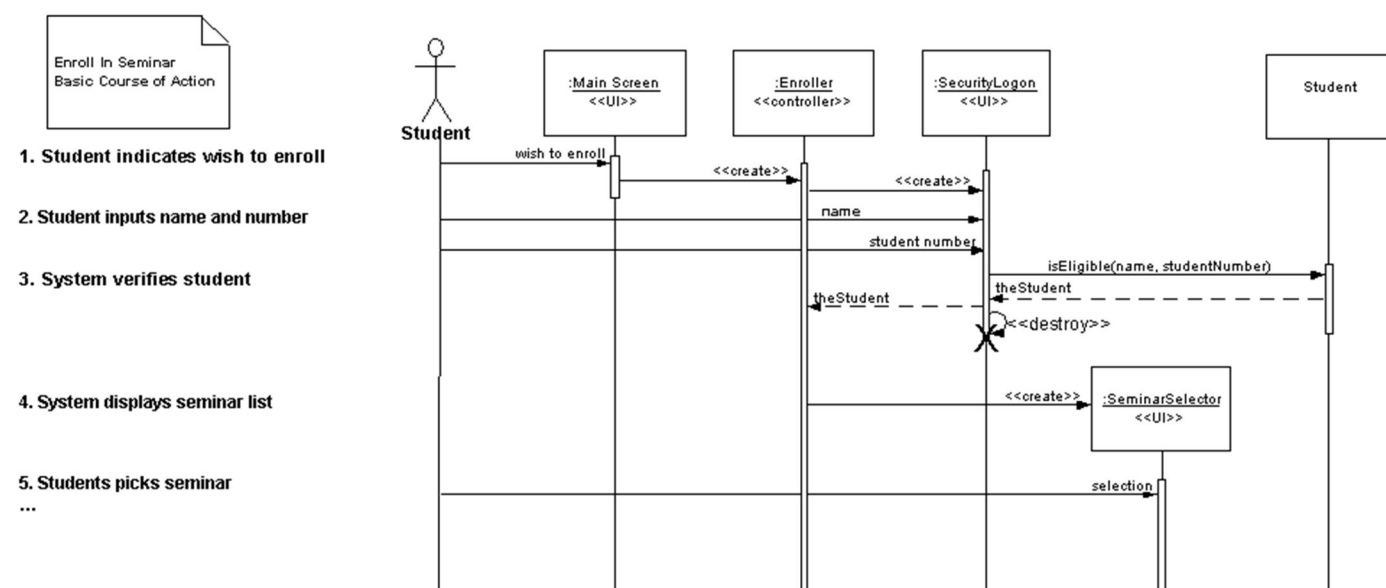The website will contain the following navigation structure

Main page

- Opening logo
- Kanukapo Investment CC address
- Mission statement
- Table with links to the other pages
- Photo of Kanukapo Investment CC
- Name of the person who created the web site and credentials
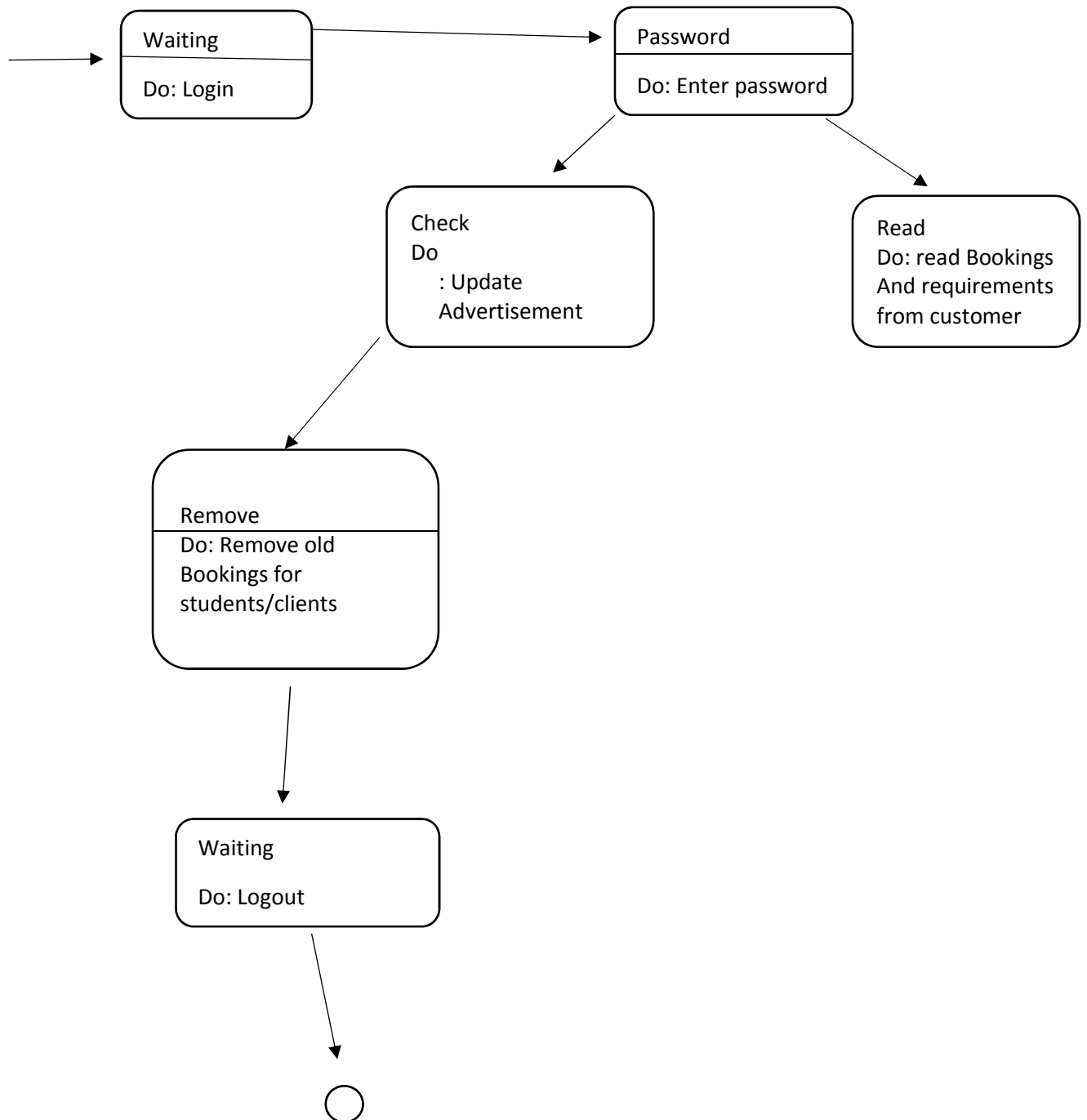- E-mail link

Other features include:

- Website keyword search.
- Visual calendar (a full page calendar that highlights specific dates and allow users to toggle between months).
- About Kanukapo Investment CC

UML diagrams

Sequential diagram

State diagram for an Administrator on the website

Waiting
Do: Login

Password
Do: Enter password

Check
Do
    : Update
    Advertisement

Read
Do: read Bookings
And requirements
from customer

Remove
Do: Remove old
Bookings for
students/clients

Waiting
Do: Logout

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System testing.

The testing process involved both a user inspection and user testing of the application to evaluate if it meets the system requirements and solves the problem. It was also designed to identify any errors along the way so that corrective action could be taken to solve them. The user testing carried out in the testing stage of the development life cycle aimed to evaluate the user's acceptance of the application as well as its success in meeting the user requirements.

Methodology.

Waterfall model this methodology divides the development into 6 discrete stages that cover every process required to develop a software system. This enables management to take greater control over the process at each stage. It will also enable management to make more accurate predictions of project schedules, thus preventing project delays and cost overruns. The six stages of development include: feasibility study; systems analysis; system design; implementation; test; and review and maintenance. Each stage is distinctly defined with a set of sub tasks and processes ensuring that all aspects of development are covered. A stage must therefore be completed fully before moving onto the next stage. I.e. no two stages can run asynchronously. The advantage of using this model is that the user is clearly involved in the development. The user is involved at both the Systems Investigation and Implementation stages. At the Systems Investigation stage the user is involved to establish the user requirements and needs of the system and again at the Implementation stage for user testing and entering data. As previously highlighted user involvement is critical to the success of the system.

The drawback of this development model includes changes in user requirements. The 6 distinct stages make the model inflexible to incorporate a change in user requirements throughout the development process. This may then mean that by the end of the development the system no longer has any real use to the user. An adaptation to this model that includes the opportunity to return to the previous stage in order to review the work carried out can overcome this problem. This is known as a Waterfall model with iterative feedback. This model allows the developer to revisit the design stage or requirements stage and incorporate any user requirement changes that may occur during development. It can however make it more difficult to predict the project schedule and there will be no clear end to each stage. Therefore management decisions will be required to decide when no more iteration's are allowed.

Through analysis of the researched methodologies it has become apparent that either Prototyping or the Waterfall model with iterative feedback is best suited for the development. While prototyping will help us to produce a solution quickly and involve the user during the physical development of the application, the Waterfall Model clearly sets out a stage to establish user requirements, which we believe will be critical to the success of our project.

The methodology followed to develop a solution to the problem identified was the Waterfall model with iterative feedback. This was also to be combined with prototyping to gain the users thoughts on the progress of the development early in the production process. The Waterfall model with iterative feedback was chosen for its advantages in providing greater management control of the development process and making it easier to predict and manage

project schedules. It also encouraged greater user involvement than other methodologies and allowed stages of the development to be returned to should there be any change in user requirements. The Waterfall model proved to be the correct development approach. Time management was made easy by the model as development stages were broken up into clearly defined tasks making them easy to manage and predict. This is evident from the few schedule changes that were necessary. Finally, the user's acceptance of the final application in the testing phase can suggest that the Waterfall model included an acceptable amount of user interaction during the development cycle.

Conclusion

The aim of this project was to research the potential needs of a web application amongst small enterprises and to help disseminate information to its members and improve other business processes. The development focused primarily on the usability of such a web application.

Appendix

The problem to be solved in this project was ideal for us. We enjoyed web development so from the very start of the project and we were so excited to begin the development of a solution. Looking back on the entire project we are reasonably happy with the quality of this report. We believe if more time was available we could significantly improve both the functionality and design of the application, and plan do so upon completion of this project. We feel our personal time management throughout this project was good as we allocated sufficient time to each section of this report. Having said this we were poor at following a schedule and did not always perform sections in a logical order. This was especially evident between the design and implementation sections as some aspects of the functionality had not been fully designed before an attempt was made to implement them. Because of this, some aspects of the functionality took longer to implement than probably would have, had the design been in place. This was a waste of valuable time.

We have taken a tremendous personal gain from this project by learning new skills that will help us in industry. We have learnt an entire new language, HTML & CSS, from scratch and expanded our web development knowledge by learning how to add interactive features to a website.

If we were to attempt this project again we would try to follow a schedule more closely and complete all the background research before the half way mark to allow more time for development and the report write up. We would also ensure a detailed design of the proposed application was complete before commencing development. We also noticed that the main reason projects fail is because programmers are too quick to commence programming, yet we did the same thing in this project. We were just lucky it didn't have a negative impact.

Diary:

Coming up with a proper and useful software system whether it is a fully fledged web site, embedded system, artificial intelligent system, the design phase is most often times the most challenging part in building a well-structured and efficient system. To be fair, it's likely that

figuring out what the client wants is probably one of the biggest challenges faced in any software project. Meeting arbitrary deadlines imposed by clueless managers - and - being "in charge" of a project and given responsibility without authority.

Before you can start with any designing and coding of any system you need to get a client and make sure you get all the necessary requirements of the system to be designed. With that being said, we all where tasked to get a client from the industry that we can develop a computer-based system for, though it was not an easy task to achieve we reached out into the industry and got a couple of people that we could possibly create a system for, we got one client where we had to develop systems that had to do with artificial intelligent systems and financial system which are way beyond our understanding and therefore we had to cut that client out and look for another client. The search for a client continued as one of us got another client that had an engineering consulting company that wanted a software that we had to create a consulting software but due to limited information about the system to be created and we also had to consider the fact that meeting that client would be a challenge we looked at clients that we could closely interact with and share ideas on, due to the tight schedule of both the client and ourselves, someone that we could use agile method of development on an incremental basis.

We reached out to people close by, and got a somewhat a "better" client that could go along with our hectic schedules. We got a client by the name Kanukapo Investment CC, a registered company that is in need of a fully-fledged responsive website. I had to meet up with the client and ask him questions from the very basic to the most obvious questions on the requirements and also on the company rules and regulations.

So, getting the client was out of the way, now we had to document what the client wants and how we would achieve that. We began with the design phase and used Extreme Programming (better known as XP).

David Nakalemo and Kunaije Kazauana were responsible for identifying and analysing all the requirement, including functional and non-functional requirements for the new system, the data that the system will need to manage, interfaces to other systems, and interfaces for different classes of users. In doing all these activities we had to meet up with our client to discuss his requirement as user requirements and the system requirements. Validating the client requirements and getting feedback for the client was all done by Immanuel Nangolo. David Hangula and Monica Oscar were responsible for architectural design, system testing and implementation.

Final project schedule:

Tasks	Names
Identify Minimum Aim and Requirements	Kunaije Kazauana, Vilho D Nakalemo, Immanuel Nangolo
Requirements Analysis	Vilho D Nakalemo
Methodologies	Kunaije Kazauana, Vilho D Nakalemo

Mid project report (documentation)	Kunaije Kazauana, Vilho Nakalemo
Implementation of solution	David Hangula, Immanuel Nangolo, Kunaije Kazauana, Vilho Nakalemo, Monica Oscar
Design of solution	David Hangula, Immanuel Nangolo, Kunaije Kazauana, Vilho Nakalemo, Monica Oscar
Progress Meeting	Once very week (March-April 2017) with our client
User testing of solution	David Hangula, Immanuel Nangolo, Kunaije Kazauana, Vilho Nakalemo, Monica Oscar
David Hangula, Immanuel Nangolo, Kunaije Kazauana, Vilho Nakalemo, Monica Oscar	David Hangula, Immanuel Nangolo, Kunaije Kazauana, Vilho Nakalemo, Monica Oscar
Collate and write the report Feasibility study	Kunaije Kazauana, Vilho Nakalemo Kunaije Kazauana
Requirement specification, Documentation, Analysis	Kunaije Kazauana
Software testing and implementation	David Hangula, Immanuel Nangolo, Kunaije Kazauana, Vilho Nakalemo, Monica Oscar
Architectural design, UML diagrams	Monica Oscar, David Hangula
GitHub	Immanuel Nangolo
Validate clients requirements and getting feedback	Immanuel Nangolo, Vilho Nakalemo, Kunaije Kazauana.

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