

# Bandwidth Management System to Monitor the Internet Connection

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**Abstract**— This research proposes the use of technology to tackle the issues being faced in terms of waste management. Nowadays poor waste management has caused an increase in landfilling and dumping sites that instigated pollution and a waste of recyclable materials that can be used for recycling or remanufacturing. The method approached to solve this issue was to construct a waste separation smart dustbin by integrating proximity sensors and a moisture sensor into a microcontroller to detect metal, moist and recyclable waste while using a conveyor belt to segregate it. The constructed prototype provided sufficient results to justify the method attempted. With this research attempted, waste management system is taking its first steps into a successful system to achieve a sustainable environment for the present and the years to come.

**Keywords**— waste; management; sensors; separate; sustainable; smart; dustbin; recyclable; metal; moist

## I. INTRODUCTION

Bandwidth management system is a simple system where it can be used in home or organization, with the advanced technology which are evolving in a fast pace, internet will be getting more traffic and the speed of users getting will become slower too, especially in a place of high concentration of people. These are becoming a nuisance for the users because they cannot stream the internet in normal speed so the bandwidth management system can help to monitor the internet connection in order to maintain the speed for every user and helping those users which is not skill enough in IT technology. The more devices connected to the same internet connection, slower speed every device will have, so our system can help to limit every devices bandwidth for them to arrange the devices bandwidth according to their needs. Besides, the service provider now are selling the internet with the plan of quota, which mean the users can buy according to quota. For example, 1TB of internet with RM100 per month [1]. This issue has make some users having difficulty in keep track of their internet connection, which make them spending all the internet connection in no time without any notification. Thus, this project's product can help them to solve it by limit the usage for device and be notified when the usage is exceeded the limit.

The researcher has explained the background of the research and problem with the current system. The reasons why needs to make a management system to monitor the internet connection so that they can find out the cause of why the traffic is overload and speed getting slow to help the users have a smoother connection. Then, they can also limit the network bandwidth for the devices so that their internet won't

overuse because nowadays a lot of service provider are selling the internet plan by quota for example like they can purchase 2GB for RM20 or 100GB for RM100. This is the reason that this system can help them to control their bandwidth before they are getting slow internet from spending all their internet quota. Besides, researcher will make an additional feature to help the users which is troubleshoot, there might be some users who don't have knowledge on the IT, so when the facing some troubles, they might not able to solve it or even find out the problem, that's why additional feature troubleshoot will come in and giving them some ease time [2].

The system monitor the internet connection by managing the bandwidth, so researcher have found out several factors to research on. Before that, network monitoring is a critical IT process where all networking components like routers, switches, firewalls, servers, and VMs are monitored for fault and performance and evaluated continuously to maintain and optimize their availability. [3] Network monitoring must be very proactive in order to maximize the performance then finding performance issues and bottlenecks proactively helps in identifying issues at the initial stage and efficient proactive monitoring can prevent network downtime or failures.

Network is something that cannot missing for everyone today, it helps people to work, run a business or making transaction. Thus, it must maintain it best performance like having a stable connection, doesn't have any downtime so that people can use it without worry. However, network is something cannot be predicted as it can be change anytime. For example, when heavy rain or typhoon hit the area hard, it may cause the network going slow or even cut off as the connection might be affect due to some incidents. Malaysia have less natural disaster compare to other country, so it is not a big issue for us to having a good internet connection. Therefore, maintaining a good internet connection is not easy, the main issue nowadays which would affect the performance of internet will be a bandwidth problem.

Bandwidth is the capacity of a wired or wireless network communications link to transmit the maximum amount of data from one point to another over a computer network or internet connection in a given amount of time, usually one second. [4] Capacity would mean the amount data that it can sustain at a time, for instance, bandwidth is like a plumbing, then data is water, if you have a bigger plumbing, you can have more water flow to your house but if you having a smaller diameter plumbing, then the water that able to flow to your house are limited. The same thing goes for bandwidth, if the bandwidth

is too small, and the users are too many, the packet transfer will get cloaked at the low bandwidth places. Bandwidth is influenced by a combination of the user, application and device in use, so interface choices can affect bandwidth and hence performance of a task. Therefore, this project system is created to monitor the packet flow through and developer able to know what kind of packet and when it has the highest concentration, then developer or users can avoid or solve the high traffic problem.

In managing networks, some researcher has made some research which is using two types of data sources, measurements and configurations. Measurements show a network's current behavior, and they include packets collected at different vantage points as well as dynamic device-specific information, such as CPU load and forwarding table entries in a router. [5]. This will help the developer have a clearer idea on how to develop the system to manage and monitor the internet connection.

The system is equipped with bandwidth limit features where it can control of how much quota a device can used internet connection for. Besides, this feature is included is because of another reason which is the students overused internet problem. Although the Internet is a technology that children and adolescents frequently use and has an important place in their lives, families have to bear the great responsibility to prevent the risks that children may encounter from this medium and the research have emphasizes that parental control and guidance are effective in reducing the negative situations that children face through the Internet medium [6]. The world now is full of technology where games, video are everywhere. Almost every student whose family have the economic capability, they will be equipping with phone, laptop or even video game console like PS4. These high techs have caused the student difficult to focus on study and their life, they solely focus on their games.

However, every technology is only a scrap metal if they are not connected to the internet, this is also the only chance where the parent can control their children in playing video games time. There is some research have made some parents' rule about their children and internet:

Parents' rules at home are positively associated to excessive Internet use.

Parents' rules away from home are positively associated to excessive Internet use. [7]

The self-regulation and parent guidance is important for children life, as the parents must make sure the children have the kids time while learning new thing and self-control.

Other than student, adults are also one of the reasons why network must be limit because employees make used of the internet connection in company for their own benefits. Employees with no limit of internet connection, he/she might delay their daily task and went for personal time like scrolling social media or watch video in the office. Despite the benefits of internet usage in the workplace, the excessive usage of internet for personal purposes, poses a threat and forces organizations to control its use. [8] Due to the advanced technology nowadays, there are a lot of spammer or attacker are trying to hack the organization or individual technology for no reason. Therefore, if the employee streams some video from a malicious website, it might simply bring a virus or attacker into the organization and causes break down or data

loss for no reason. That's why the system with the features of limit the internet connection is important for anyone, no matter is the personal used or organization as it can help to solve problems that everyone is facing today.

There are a lot of similar tools or software with the same features, this project is just doing the similar approach as them but in a smaller scale where it only limit to the home-based system or small size business.

## II. RESEARCH METHODOLOGY

RAD is agile software development methodology where it is prioritizes on rapid prototyping and quick feedback over the project. With rapid application development, developers can make multiple iterations and updates to a software rapidly without needing to start a development schedule from scratch each time. [9] RAD is form after the waterfall methodology because of the flaw of waterfall methodology. Waterfall works by going phase to phase, once it passed the phase, it can't return to make any changes on the core or functions. This is the biggest flaw of waterfall, so RAD have being introduced due to that.

Initially, RAD are working by the pattern of spiral model where one or more development models were used to work on a particular project. [9] Then, it keeps on changing across the time to adapt the market and technology. RAD more focus on work than communication, it is stricter on development and testing parts, so it will keep on testing until the whole project or product are complete. By reducing planning time and emphasizing prototype iterations, RAD allows project managers and stakeholders to accurately measure progress and communicate in real time on evolving issues or changes. [1] This will bring the result of greater efficiency, faster development, and effective communication. Below are the pros and cons of rapid application development methodology.

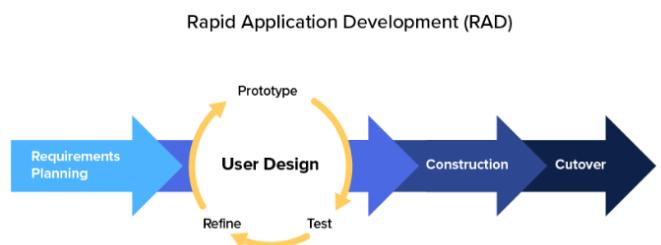


Fig. 1. Rapid Application **Development**

### A. Requirement Planning

This phase is planning phase, where all stakeholders must attend in order to get a clear objective of what the project wanted to achieve. For this project, this phase is where the researcher has to meet with the supervisor to get advised, research and getting all the analysis from the targeted users. This is the important phase for the project to get started, without the resources and information from this phase, the project can proceed in fast-paced behind. Below is the simple break down for phase 1:

- Researching project from the problem and possible solution
- Finalize the requirement for the project

- Get approval from the supervisor and mentor for the researcher to start the work.

#### *B. User Design*

Then this phase is where the design and development phase start, researcher can start to collaborate with the developer to start their prototype design and implementation. Then they can try out all kind of prototypes to give the users to try. The developer designs a prototype, the client (user) tests it, and then they come together to communicate on what worked and what didn't. In this work, they researcher are also developer; thus he needs to do various type of prototype for himself and supervisor to try, this will give the developer the opportunity to adjust the product until it reach their expectation and satisfactory [10].

#### *C. Rapid Construction*

This phase is an important and busy phase as it contains of the feedback from the users, not only functionality part but also visual and interface. The prototype is closing to the end, so the developer has to do all the testing and modification while getting more suggestions from the users. Therefore, for our project, developers must get more feedbacks and suggestions from the users or supervisor because to get a better product. The developer must able to do a fast modification and testing while getting new suggestions, so this is the most important and stressful phase. Below is the simple breakdown of Phase 2.

- Need to be prepare for the rapid construction
- Implementation of the application development
- Testing – Unit, integration, user acceptance and more

#### *D. Cutover*

This is the last phase where the product is going to launch. It includes data conversion, testing, and changeover to the new system, as well as user training. Once testing is done, the final product is delivered to the end user, thus this method of rapid prototyping and continuous user feedback can seem like genius, but it's not a one-size-fits-all shoe. (Kissflow, 2018)

### III. RESEARCH VALIDATION

#### *A. Data gathering and analysis*

Data gathering is a systematic way to collect and measuring all the information and resources from different places to make a complete picture of the data. Data collection allow an individual or organization to make a prediction about the future possibilities based on the data they collect through the data collection. Accurate data collection is essential to maintaining the integrity of research, making informed business decisions and ensuring quality assurance. [4] Besides, data can be any form as it can be collected from a person, a website, or a book. It is different for every data that researcher searches for, so one must be sure about what kind of data they wanted and requirements.

Data also been differentiated into two types, quantitative data and qualitative data. Quantitative data are data that in analytical form like the statistic or percentages while the qualitative data are the data that is descriptive data like the quality or appearance. Data are very important for any individual or organization, as they can use these data to analyze and predict the outcome of certain project.

The work is inventing a new system for the users to monitor the internet connection, so researcher had to gather some data from the target users and analyze what kind of system the users are expecting. From the data that been collect, researcher can figure out the problems the users are encountering now and features that are able to help the users to solve their problems. The main objective for the work is where it can help users and ease their time for doing their daily task. Without the help of the data gathering and analysis, researcher unable to create the product.

#### *B. Project deliverables*

The work is going to be deliver will consist of a lot of suggestions and opinion from different people, no matter is working or studying. The research method will help us to gather all the data that researcher needed and analyze it to make the project have more content and better functionality. This will help to make this project improve in term of technical part. Therefore, the project that going to deliver is full with all the research and opinion from different region and people.

Construct validity main aim is to identify if the interpretation created about the results and assessment are meaningful and support the purpose of assessment. Primary research is a method used by developer to collect the data rather than depending on previous collected data. Primary research is simply carried out to address a certain problem. Primary research provides result specifically about the system. This research is developer's own original work. Primary research is used to validate system idea, evaluating the need for the system among the students, examining the problem statement, understanding the student's pain point and preference and informed decision in the favor of system. The advantage of primary search is that data collected is firsthand and accurate. Primary research allows researcher to go in depth to get the data according to the system. There is control in collecting data by researcher. It is up to researcher how they collect and use the data. Although this method of research is time consuming but worth of it because of the accurate data. The data will be collected in two ways quantitative and qualitative.

### IV. CONCLUSIONS

In this research achieved sufficient report and the information that start to gather for new data. Collect all the resources and information, then use it to make some essential analysis for the project. The method to analysis is various included interview, questionnaire and other ways of analysis it to confirm the user expectation. After collect and analyze all the information, it will proceed to the implement stage where the product is producing. The prototype for testing purpose and continue to the real product after ensuring all element parts are correct. Every project has to get a testing stage because it is the phase where use to evaluate every functionality of the product and judge whether this product is a success or failure. If the testing result is negative, then it won't make a new impact to the market where it might bring loss to the researcher. Every product must get a maintenance or monitoring in order to make sure this product can keep on running without any fault. This is the stage where most of the project fail because they only care about creating or making the activities, but they also forget that maintenance is an

element that can be overseen. Without maintenance and monitoring then the product will not stay long at the market. This report was made by analyzing all the requirements that developer needs to develop the proposed system. A researcher learnt many skills and knowledge such as analysis skills, data finding methods, interviewing skills, handling questionnaire, time management skills, documentation skills, database skills, and the data have been gathered by analyzing skills.

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