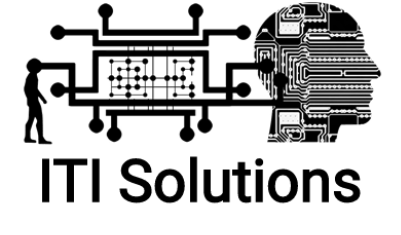
12/2/2019

Milestone 5

Data Modelling



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**Client Signature:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   **Date:** \_\_\_\_\_\_\_\_\_\_\_\_

Edenbridge Family Services

Scheduling and Time-Tracking Database

Software: Schedule ED

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# Client & Current System

Edenbridge Family Services is a Lethbridge-based organization that specializes in assisting individuals with special needs as well as providing counselling services. They are mostly funded by the government, but they also have some private clients. The system they are having us replace is a mixture of physical media and digital spreadsheets with a scattering of paper binders, timesheets, and Excel work sheets each containing a myriad of information. This information is used to keep track of employees, clients, the shifts that employees work, and the number of hours any one client is allocated per month which in part defines the shifts. The system currently implemented at Edenbridge has a few issues, mostly with the transfer of data from physical forms to digital spreadsheets. The first major issue that presents itself in standard operation is with accidental double-booking. In some instances, two employees will both submit a timesheet that contains the same shift, usually due to the shift being rescheduled. A second major issue is the current system does not allow for an easy way of checking at a glance how many more hours a specific client is able to be booked for. This can cause issues when a worker is accidentally scheduled for overtime when there is no notable need. As such, Edenbridge has requested that a new system be developed and implemented that can meet all requirements that they have set out. To solve these issues, we are developing a database management system to record and keep track of the workers’ schedules.

# Feasibility

## Off-The-Shelf

### Technical Feasibility

Off-the-shelf systems typically come with a compatibility list that you can check against your current architecture, or so you can build up a network of computers that will be able to support the system. For Edenbridge, there are a few options for systems that could technically work but will likely not include enough features to fulfill Edenbridge’s requests. An off-the-shelf solution would be technically feasible for Edenbridge to implement but might not be exactly what they need.

### Economic Feasibility

A prebuilt system is usually the least expensive solution for a business. Because the off-the-shelf solution is made to be sold to multiple companies, the cost to each of them is lowered. This lowers the bar for entry so that smaller business can take advantage of these systems. Edenbridge would be able to afford a less expensive off-the-shelf solution, but due to the complexity of their scheduling system, they would need something much more expensive to meet all designated requirements.

### Organizational Feasibility

Off-the-shelf systems are typically built to be generic, meaning they require heavy customization to be effective for most businesses. For Edenbridge, any kind of off-the-shelf systems would require heavy modification to work with the organization. Otherwise, they would have to change the way they do their business to fit with the purchased system. A big change like this would force employees to change the way they do things, which is not very feasible for an organization like Edenbridge.

### Feasibility Summary

Off-the-shelf systems can work for a great number of businesses with their low cost to implement and relatively low barrier to ensure it works with existing infrastructure. Off-the-shelf systems are usually cheaper than something custom made, but there is nothing available that would be useful for Edenbridge without some heavy customization. Overall, an off-the-shelf solution would be feasible for Edenbridge to implement, but it would still require a lot of work for them to configure it so they can use it effectively.

## In-House Development

### Technical Feasibility

For an in-house system to be feasible, there would need to be employees at the organization to develop the system. For a tech company, an in-house solution may be much more feasible than something prebuilt. However, because of the type of organization that Edenbridge is, none of the employees have the skills or qualifications to design a system that could be used by the organization. This means that an in-house system is currently not technically feasible.

### Economic Feasibility

An in-house system would be the most cost-effective custom system. Edenbridge would only have to pay for time worked on the system at their rate and the timeline could be changed at will depending on need and cashflow. Any materials needed for the project would also come at a cost. Theoretically speaking, an in-house system would be economically feasible for Edenbridge, if there are employees who could build it.

### Organizational Feasibility

Because of their knowledge of how the organization functions, an in-house system would be the best choice for Edenbridge if they had employees with the skills required to build a system. They would be able to make a system that matches the business model better than any other option. It would also be much easier to introduce the system to employees, as they would know best what the other employees would want from it. In-house development would also allow the employees to troubleshoot the system when something goes wrong without having to get someone from outside the company to fix it. In terms of organizational feasibility, an in-house system would be feasible to adopt assuming there is someone who could develop it.

### Feasibility Summary

In-house development would be economically feasible but the employees at Edenbridge do not have the training to build a custom system. If an employee were to develop a system for Edenbridge, they would need to learn how to do so first, which would take far too long on top of the actual development time. Additionally, the cost that would be put into training and development would be far better spent on other business needs.

## Custom Development

### Technical Feasibility

The custom system we would be developing will be able to interface into much of the current infrastructure. The two main components, scheduling and time tracking, would be tightly interlinked because technically each one could be implemented separately, but they both benefit from functionality that would be present in the other section. In doing this, it establishes a greater degree of feasibility in the technical sense by creating further instances where the system can not only fulfill technical requirements set out by Edenbridge, but to expand upon the capabilities presently available in the current system.

### Economic Feasibility

The implementation of the custom system that we are proposing would include the usage of multiple open-source technologies that allow benefits such as a greater degree of customization and lower software costs. The benefits to Edenbridge stand to be completely inside the realm of increasing efficiencies in standard operations and a reduction in errors, especially those that are present in the system currently implemented at Edenbridge. Figures such as the break-even point and net benefit value are unfortunately harder to calculate as prior mentioned benefits are solely in the realm of efficiencies and error reduction. Normally, a custom system would have some of the highest costs of the three development options as it would be an external team who are experienced if not outright professionals in the field building the system. In this instance however, the development costs are slashed by a significant margin with no labor costs and other minimal costs to Edenbridge, making the system quite economically feasible.

### Organizational Feasibility

With our custom system, it will be built specifically for Edenbridge so the employees should not have many issues learning how to use it. Given proper training, employees should not experience any difficulty in adjusting as many of the core processes will be similar to the system that currently exists at Edenbridge. The purpose of the system as we are proposing will be directly aligned to organizational goals at Edenbridge and we expect it will be a welcome change, especially for the coordinators and bookkeepers.

### Feasibility Summary

Edenbridge as a client appears to be comfortable with adopting new systems and technologies. The system as proposed has near zero up-front costs and minimal long-term costs, in large part to our services not resulting in a financial cost to the client. Compatible components, such as their Windows server, will also assist in bringing down the total cost of the system. While the overall flow of the system as proposed will differ slightly from Edenbridge’s current system, it will allow for a relatively simpler time utilizing it. Overall, our proposed custom system as it is presented currently is well within the scope of the request and is ultimately feasible to build.

# Summary and Recommendation

|  |  |  |  |
| --- | --- | --- | --- |
|  | **In-House** | **Custom** | **Off-the-Shelf** |
| **Cost**  **/10** | As the developers are already working for the company, the costs will not be as high as hiring someone from outside the company.  Value: 8/10 | Hiring professional developers will cost much more than getting someone from the company itself or buying something prebuilt. However, since we are developing the system as a part of our course, there will be no development costs to the client and minimal long-term costs.  Value: 10/10 | Off-the-shelf systems will typically have a low cost, with business plans or purchases being on a license-per-user/install basis. These plans, however, will differ by the company selling them, and this variance can bring the end price-point on par with either custom or in-house solutions.  Value: 7/10 |
| **Time**  **/10** | Timeframe depends heavily on if pre-existing time commitments for other duties must still be fulfilled. If they are, then the timeframe for in-house development will be extended to the longest of any of the three styles.  Value: 3/10 | Because teams working on custom solutions are professionals, the timeframe will on average be quicker than that of an in-house solution but still an order of magnitude slower than off-the-shelf solutions. This also varies depending on development methodology (waterfall, agile, RAD, etc.).  Value: 8/10 | There is effectively zero development time on the part of the client at the time of purchase, making this the most time-efficient method of delivery. Resultant modifications, however, can drive up the timeframe of implementation drastically.  Value: 10/10 |
| **Quality**  **/10** | If the team in-house is not consisting of professionals, the quality of any system will be of a lesser quality compared to that of external custom development or off-the-shelf systems.  Value: 3/10 | With the team consisting of professionals, solutions resulting from an external team working on a custom solution will on average be of higher quality and cohesiveness than either of the two other methods.  Value: 10/10 | Usually good quality, with most bugs in the system worked out in the released version. However, it is not designed for a specific system in mind and does not work as well as something custom-made.  Value: 8/10 |
| **Overall** | If there are people in the company who know how to develop software, they may be able to develop something decent, but it will not be as high quality as something developed by a professional.  Value: 14/30 | Usually, custom development will be much higher quality, but with a high cost. In this case, it is an especially good choice as the system would be developed with very low costs.  Value: 28/30 | Cheaper alternative, but not the best choice. Because it is more generic, it will either not have all the features necessary, or require heavy customization.  Value: 25/30 |

## Recommendation

The system that Edenbridge requires is quite specialized, with several special considerations. Because of this, an off-the-shelf solution like ComVida would not be as effective as something developed for the organization. However, there is no feasible way for someone at Edenbridge to develop the necessary software as there is nobody working there with the skills to do so. This leaves the option of custom development, which is the most optimal choice for the desired system at Edenbridge.

# Budget

The budget for this project lands on the simpler side of things, with a heavy amount of the standard costs associated with a project being heavily reduced if not eliminated completely. A major component associated with the budget, the labor costs, is one such cost that is being eliminated entirely. This presents cost savings in the realm of $15,000 assuming a standard rate of $100/hour at approximately 4.7 hours per week over eight months. Additionally, a maintenance plan that would normally be offered will not be made available, which presents a minimum optional $1,500 saved on the end cost of the system. However, to allow for the maintenance of the system, the source code of all components and the documentation associated with it will be provided. Unfortunately, this means that for modifications and maintenance, a team may need to be redirected to maintaining the system from time to time to account for changes in the environment. Finally, there are other areas where we can save money on this system by utilizing open source technology to negate the cost of numerous programs that would be required. The cost of a domain has not been included as Edenbridge already has a domain via a hosting service. Two optional costs associated with this project at this time are those associated with the utilization of a tablet to allow for some ease of access and with e-signature programs.

# Timeline

This project follows a timeline lasting approximately eight months, spanning from September through to about mid-April. As of the end of this milestone, the planning and analysis phases will be complete. This leaves the design and implementation phases, which will take until the end of the project in mid-April.

A breakdown on the tasks are as follows:

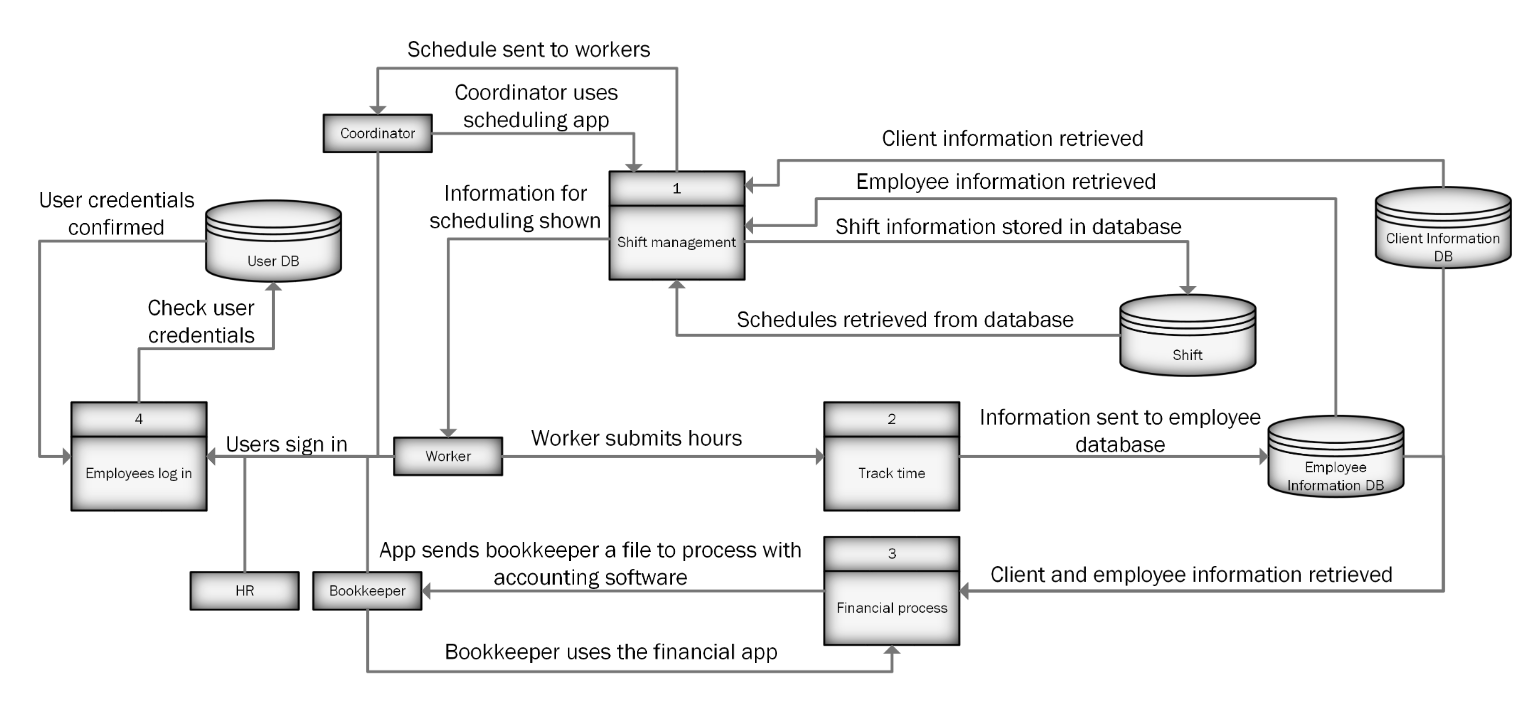
* Final Database Design:
  + Verifying structure of database as proposed and ensuring it is consistent with what is required.
  + Establishing a backup/restoration plan for the database.
* Design:
  + Designing user interface and screen layouts.
  + Designing the process flow of the system.
* Implementation:
  + Programming web interface.
  + Establishing the database with all structures and relationships as detailed prior.
  + Testing all components to ensure functionality and security.
* Training:
  + Establish a training regimen in conjunction with the system.
  + Generate materials to accompany training.
* Delivery:
  + Establish an implementation plan for delivering the completed system.
  + Install system and ensure everything is left in working order
  + Train staff in the system, with a focus on the changes from their older system.

# Proposed System Model

The system we are proposing as mentioned before encompasses two major areas: time tracking and shift scheduling. These components are going to be highly interconnected, with the information from time tracking reading, manipulating, and ultimately utilizing the data available from the shift scheduling component with the same being true going the opposite direction. At the core of this system is a normalized database that acts as a hub for many of the system’s operations with everything reading, writing, and otherwise using data from the various areas in the database. The core components we have chosen to support the user-facing interface are Apache Web Server and a web application that uses PHP to modify and display data from a MySQL database. These have been chosen for multiple reasons, first and foremost being the familiarity we as a team have with these components, and secondly because of the degree of customization available through extensions included with them. All these components that operate as the supporting infrastructure are open-source, giving us extensive functionality with which to tailor the system to Edenbridge’s needs.

The following diagrams give an overall picture of the design for the proposed system. The data flow diagram shows the general flow of data from the user’s perspective, including the different data stores and processes. The entity relationship diagram gives a general idea of how the data is going to be organized, including the keys that link the tables. With the utilization of primary and foreign keys, the data will be linked together which will allow for a far easier experience for end-users to be able to utilize the information they will access to and assist in the reduction of errors as a result.

## Proposed System Data Flow Diagram



## Proposed System Entity Relationship Diagram

A screenshot of a cell phone

Description automatically generated

# Lessons Learned

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Submitted By | Milestone | Experience | Lesson | Lesson Type | Effect | |
| Dec. 2, 2019 | Justin | Milestone 5 | By getting a head start on some projects, I was able to finish them early, giving me more time to focus on more important things, like the Systems assignments. | Get a head start on assignments, do not start working on things the day before they are due. | Academic | From now on, I will try harder to start working on things sooner, as I enjoy not having to stress about finishing assignments a few hours before they are due (except when milestone documents are due apparently). |
| Dec. 2, 2019 | Beryon | Milestone 5 | Overly broad? Maybe. End of this milestone, I feel like I have a shockingly concise view about how this system will look at the end of it. The little technical details are coming together in my head enough to visualize it. | The entire waterfall process we’ve gone through so far has been especially helpful to be able to grasp how this system will come together. | Personal | Going into the second half of this project I feel far more confident about it. Enough so that I am starting to get a feel for how individual components would come together. This means that I can start building a framework to be able to run off of once we begin the related sections. |
| Dec. 2, 2019 | Harley | Milestone 5 | Overestimated the cost of the project | Professionals would be significantly more experienced which would allow them to achieve the same thing we are in a third of the time or less | Personal | I will spend more of my spare time working on programming projects to gain experience and make it second nature for myself to complete the tasks involved in development. |
| Nov. 29, 2019 | Aidan | Milestone 5 | Wearing myself out with work and not letting myself have some time to sit down and rest | Next semester I will allow for an hour between school and work | Personal | This will give me some time to sit and rest between the two major things I need to do in a day |
| Nov. 26,  2019 | Evan | Milestone  5 | Learning how project design works | I have no interest in making systems for a living | Personal | When I pursue a job in I.T. I will not choose one involving system design for outside sources. | |
| Nov. 18, 2019 | Evan | Milestone 4 | Having diminished cognitive activity due to 8am classes | I now know what it feels like to have Alzheimer's, it is an ungodly fate to anyone who develops it. | Personal | Will plan my next semester with 8am classes on alternating days. | |
| Nov. 18, 2019 | Beryon | Milestone 4 | Flash of inspiration coming from a different class, an idea to use Windows credentials to act as the login for the web portal. | Upon further reading, it appears possible to utilize existing Windows login credentials for logging into the site. | Technical | This is entirely subject to the existing structure and how the site is currently set up, as this segment of the system would depend heavily on the utilization of IIS. If it is utilized for the site, then we have our login system. Again, pending some questions though. | |
| Nov. 17, 2019 | Harley | Milestone 4 | I became acquainted with SQLyog. | SQLyog is a powerful GUI based tool for interfacing with MySQL. Previously I wrote scripts for everything I did with MySQL databases. | Technical | I should be able to create and modify databases a bit faster now that I have SQLyog. | |
| Nov. 14, 2019 | Aidan | Milestone 4 | I learned more about how php functions | Php does not remember where you are when it sends back the web page so you have to program it to save values that you want to manipulate later | Technical | This will help me to make the web app function and remember where the user is along the process | |
| Nov. 14, 2019 | Justin | Milestone 4 | I learned the basics of integrating databases into PHP, which will be essential for our app when it is developed. | Now that I know how to actually make everything connect, creating the web app actually seems like something that can be done. | Technical | Now that we know how to create the web app, we have an idea of how we can get it to work. | |
| Oct. 26, 2019 | Beryon | Milestone 3 | This may be similar to an earlier one I did but found out the designer aspects within the Office Suite is a fair deal more powerful than I initially expected, even with 5+ years of experience using it for educational things. | Design and layout aspects within Microsoft Office Suite has far more functionality than it initially looks like. | Technical | With this Milestone as can be observed, there’s a good deal more effort that I put into the presentation of the document and the layout such as with the table of contents which is almost automated with using the styles bar on the home tab. This knowledge will be carried forwards into not just other documents, but all files created during this project. | |
| Oct. 26, 2019 | Evan | Milestone 3 | Visio’s sharing policies are not as optimized as the rest of the office suite. At multiple times what was the newest version was unclear. | Don’t rely on Microsoft office to share and maintain files across users. | Personal | If Visio or a program similar is used in the future, a repository type program needs to be used. | |
| Oct. 24, 2019 | Aidan | Milestone 3 | Not knowing enough about the scheduling process and how it is going to function | Focusing too much on the extra details of the system and not asking questions about some essential parts of the scheduling system | Academic | I will try to look at the big picture more often to check if I am only looking at one part | |
| Oct. 24,  2019 | Harley | Milestone 3 | Received a poor grade on Milestone 2 | Proofreading everything extensively is very important to ensure the documentation is up to the standard expected of us. | Academic | I will now be aiding in the proofreading and revision going over the deliverables multiple times to ensure what we produce is high quality as much as I’m able to. | |
| Oct. 18, 2019 | Beryon | Milestone 3 | Lesson? Reminder? Whichever, finally sunk in that this is an actual system being developed. | Far more detail than what I was accustomed to doing with classwork is required for this systems project. | Personal | Going forwards, will be redoubling efforts to ensure every little detail with what we do to ensure that it not only fulfills the deliverable requirements, but also to whatever specification the client provides on an aspect. | |
| Oct. 17, 2019 | Justin | Milestone 3 | We started focusing too heavily on aspects of the project that were not very important | Focus on important things first, then think about extras later | Academic | From now on, we will focus on the functionality of the system, anything extra will only be considered after the basic requirements are met | |
| Oct. 11, 2019 | Beryon | Milestone 2 | Project has a substantial feature-set, most of which was previously unknown from the first couple times. | Learned a good amount about how to work Project, including different ways to set up tasks and organize them. | Technical | Going forwards, should be far easier to arrange events and plan things out via Project. As a side effect, there’s a measure of knowledge attained in how to potentially display events in the system being developed. | |
| Oct. 11, 2019 | Justin | Milestone 2 | Milestone presentation was not great, no intro or conclusion | Make sure assignments include all components | Academic | We will have a team member observe presentations from the other class to know what needs to be included for future presentations | |
| Oct 11,  2019 | Harley | Milestone 2 | Organization  of presentation  was not ideal. | The order in which the information is presented is very important if we want it to be easy to follow. | Academic. | Someone will be assigned the duty of analyzing the presentation to ensure the flow of information makes more sense. | |
| Oct 11,  2019 | Aidan | Milestone 2 | My work school balance was not great for the first month of school | I learned how far I can push myself before my school begins to suffer from it | Personal | Going forward I am not taking as much hours at work and am going to say no to more hours when asked so I can focus on this project | |