BYU

On-Campus Housing

Incident Management System
System Analysis and Design

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Section 1: Background Information

Executive Summary

The purpose of this report is to provide an analysis of the current incident management system used by BYU On-Campus Housing. The on-campus housing opportunities provided by BYU prove to be among the best in Provo, as they include services and amenities that are unmatched. After understanding the needs of residents and employees, we began to see how the current system benefits each. We also found many opportunities for innovation.

 While BYU has created ways to enhance the user experience through its resident portal (see figure 6a in appendix), thousands of residents still rely on an outdated system to report incidents and request maintenance. Because the principal service provided by BYU On-Campus Housing is their resident experience, it is necessary that the needs of every resident be taken into account. Incidents happen very frequently, whether it be a laundry machine not working, bullying, or a student battling depression. BYU takes these matters very seriously and seeks to resolve them in a timely manner. The current incident management system requires resident assistants to fill out paperwork and communicate with management, in-person or over email. While these tasks get the job done, they can easily overwhelm resident assistants with mundane work. Because much of the information passed between resident assistants, management, and residents are not documented well, many misunderstandings arise. In our report, we have proposed a system that would alleviate many of these responsibilities and greatly benefit BYU as a whole. This proposed system would:

1. Alleviate the responsibilities of resident assistants by automating much of their work and creating a portal to help them manage their tasks. This would include sending automated emails, displaying the status of work orders, and digitizing documentation.

2. Give residents the ability to make incident reports and maintenance requests, as well as view the status of said requests. In turn, this would further lighten the responsibilities of resident assistants. Residents, and their parents, could also stay up to date and easily provide any additional information.

3. Shorten the time between when the incident is reported and when it is resolved by streamlining the processes involved. By automating certain tasks, area managers can stay informed of new incident reports and resolve them quickly.

We have included diagrams to represent the current and proposed systems, as well as a thorough analysis of each element.

Business Background

The services provided by BYU through its on-campus dorms help satisfy the high demands for housing in the area. Helaman and Heritage Halls, managed by BYU On-Campus Housing, are notorious for their proximity to campus and exciting events. The social scene at on-campus housing is especially popular among first-year students as it creates an environment catered to incoming freshmen. These apartments typically have volleyball courts, pavilions, pool and ping pong tables, and activity rooms. Because residents live so close together, they naturally make new friends and develop relationships that last their entire college careers. The experiences living on-campus are some of the fondest memories of BYU graduates, and thus inspire new generations of BYU students to follow suit.

In addition to these benefits, BYU On-Campus Housing offers various amenities to students. All on-campus residents, for example, have dining dollars (a meal plan) that they can spend at various restaurants, dining halls, and stores throughout campus. This allows residents to focus on their studies instead of spending time cooking. Many of the residential buildings at BYU are also recently built and offer living spaces, music rooms, common areas, laundry facilities, parking, study rooms, and much more. BYU On-Campus Housing includes all of these benefits in one simple monthly price, which allows residents, and their parents, to know their expenses beforehand, in contrast to off-campus housing which can sometimes come with hidden fees. Through an online resident portal (see figure 6a in appendix), residents can easily view their account information, make payments, communicate with management, and much more. Overall, the service provided by BYU

On-Campus Housing is unmatched as it enhances the college experience and creates a community for students to excel.
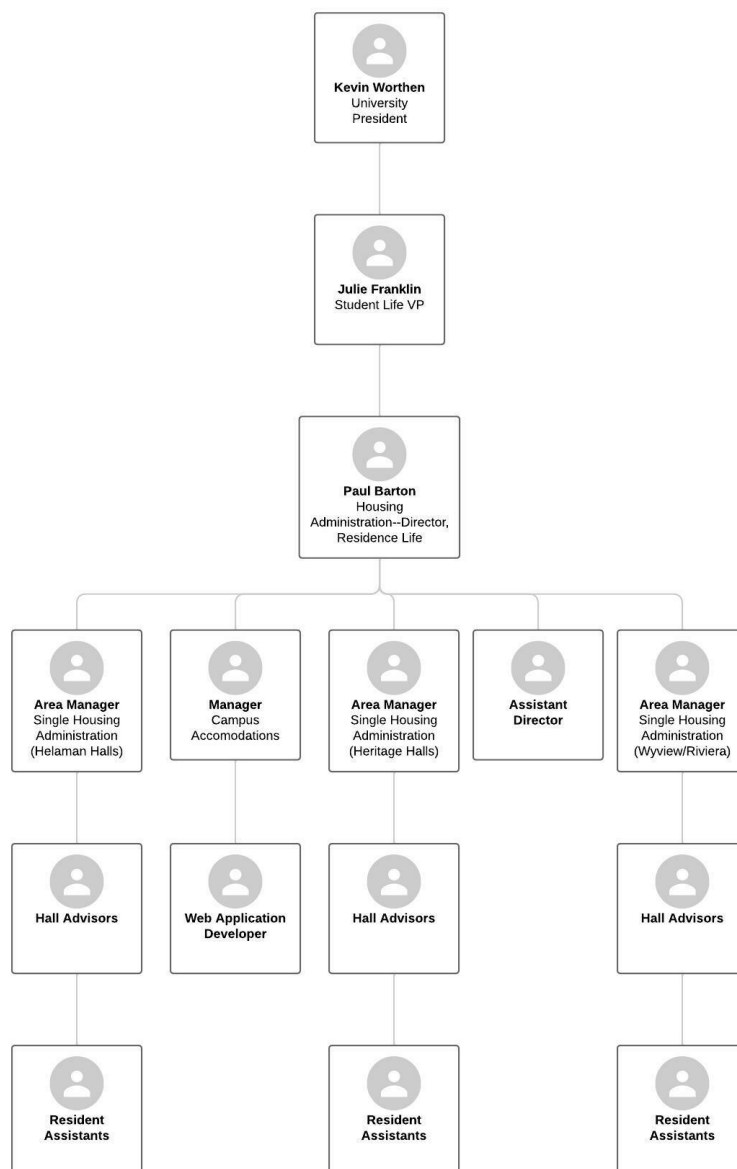
Business Organizational Structure

As a part of Brigham Young University, BYU on-campus housing ultimately reports to BYU's President Kevin J. Worthen. Julie Franklin, the Vice President of Student life, is the top university executive who is responsible for dealing with housing. Paul Barton is the director of all housing administration. While BYU on-campus housing is under the ultimate authority of BYU, it has its own independent budget from the University and therefore has lots of autonomy in managing its affairs.

Underneath Paul Barton are the Area Managers. Area managers oversee a specific housing complex, such as Wyview or Helaman Halls. They are responsible for the day-to-day operations of these housing areas and manage the employees working in these areas, as well as meeting with students that live in these areas when it comes to important matters such as behavioral issues.

Multiple Hall Advisors work underneath each area manager. Hall Advisors are meant to be mentors for Resident Assistants and a person who they can have a personable relationship with to discuss problems. While Hall Advisors are considered full-time employees, many are older part-time students nearing the end of their time at the university (often married students or master's students). A Hall Advisor is assigned to a single building and is over all the Resident Assistants in that building (in rare cases they may cover multiple buildings).

Resident Assistants are student employees. They are expected to meet with and become acquainted with the residents they oversee (typically one hallway of students). They are expected to provide an example of leadership, hold community development meetings, ensure safety and security, answer resident's questions and help them resolve concerns and conflicts. There are usually multiple Resident Assistants per building.

Kevin Worthen
University President

Julie Franklin
Student Life VP

Paul Barton
Housing Administration--Director, Residence Life

Area Manager
Single Housing Administration (Helaman Halls)

Manager
Campus Accomodations

Area Manager
Single Housing Administration (Heritage Halls)

Assistant Director

Area Manager
Single Housing Administration (Wyview/Riviera)

Hall Advisors

Web Application Developer

Hall Advisors

Hall Advisors

Resident Assistants

Resident Assistants

Resident Assistants

Section 2: Business Case

2a. Business Problem

The transition from living at home with parents to away at a college on your own can be hard, so universities employ "Resident Assistants''. Their job is to assist students in the transition from living at home to living in the on-campus community. Resident Assistants have to deal with students who struggle with a wide variety of issues (depression, suicidal ideation, etc.), violate housing policies (vandalism, creating issues with roommates, etc.), as well as upkeep and security of the dorms in general. While some of these issues may be outside the hands of BYU On-Campus Housing, they have made an effort to combat as many as they can.

In the current system, common actions such as paying rent, setting up automatic payments, adding money to a dining account, and many more are implemented in order to simplify the lives of students. Each student has a portal through which they can access a variety of information about their housing. BYU has even created a way for the parents of students to access their children's accounts, with the student's permission, and take care of certain tasks. All of this is done with the purpose of helping students adapt to life away from home and focus on their studies. While this system fulfills the needs of residents, there are many changes that need to be made to the system used by resident assistants. Resident Assistants have the responsibility to follow-up on any incident or maintenance request reported. To do so, they often have to fill out paperwork, communicate with management, and perform a variety of other necessary tasks to resolve the issues.

Currently, the processes used by resident assistants to fulfill these requests are outdated. They currently rely on word documents, emails, and word of mouth to do their job.

On-campus housing has struggled with hiring new Resident Assistants and retaining old ones. Smoothing over the process of reporting could help management be more effective in responding to the issues that Resident Assistants have to deal with, resulting in a better reputation for the job and easing management's difficult annual burden of finding qualified candidates to fill vacancies.

Our report will focus on the incident management system used by resident assistants and residents alike. We plan on proposing a system that would automate many of the mundane tasks performed by resident assistants and creating a portal through which they can manage their various responsibilities. Additionally, we plan on creating ways for residents, in certain cases, to view the status of incident reports and provide additional information.

2b. Project Scope

An online system called the Incident Management System by which BYU on-campus housing employees and residents can file incident reports according to events that occurred in their housing units.

RA's and other housing employees will also have the option to update reports. Housing managers have the option to record what actions were taken to resolve incidents and to

tag incidents as resolved. Those who submitted the resorts can be allowed to view the resolution of reports they submitted. This system could be integrated into the wider on-campus housing portal (see figure 6a and 6b in appendix) by which students and Resident Assistants can pay rent, sign up for bedspaces, etc. However, discussing the specifics of that portal (which already exists) in detail is beyond the scope of this project, which focuses on the purposes and function of the system which manages incident reports.

2c. Feasibility Analysis

We have assessed three main aspects of project feasibility which are explored below.

Technical Feasibility: Low Risk

Based on research, we classified technical feasibility as low risk for implementing the proposed system. Currently, the BYU On-Campus Housing department has internal employees who work on the web application and existing systems for handling the website and other technical issues. Our proposed system would only require integrating additional features into the existing system, thus technical safety and performance are insured.

To guarantee a fully functioning website after the integration of new features into the existing system, we plan on implementing them piece by piece and monitoring the new system over the next months. Using the modeling design for this project will allow the existing system to function and adapt with additional parts over time. We can further reduce the technical risk of the planned system by assigning web developers to monitor

and modify the system to make sure no system errors arise in the integration of the new system.

Operational Feasibility: Low Risk

The proposed plan to implement new features into the website provides a low risk. Risks include familiarity with the existing system and potential errors in the new system.

There is a low risk associated with the familiarization of the system. Employees of the BYU On-Campus Housing department are acquainted with the old Housing system and have had experience working with the BYU On-Campus Housing website (see figure 6a and 6b in appendix). The implementation of new features may cause confusion and deficiency for both employees and students as it requires effort to familiarize themselves with the new system. However, the stress will decrease over a short amount of time as the additional features will provide increased convenience for employees and users.

There is a higher risk of possible system error in the implementation of the project as it may cause disruption in fulfilling responsibilities such as reporting incidents. To alleviate this problem, the new system will be integrated partially to ensure full functionality and minimize risk. However, the estimated chance of error is low and can be prevented by holding regular meetings with web developers to verify that no errors have been made.

Financial Feasibility: Low Risk

BYU On-Campus Housing faces a low risk in financial feasibility of the proposed system solution. We have estimated that the new system will require 1000 hours from web developers designing and working on the BYU On-Campus Housing website. Since BYU currently employs web developers who work on their web systems, developers from the outside would not need to be hired, which would help keep costs down. In short, because BYU and BYU housing already has funds allocated to web development, it is more a matter of budgeting time and resources correctly and prioritizing development of the Incident Management System, rather than pulling large amounts of funds from other projects in order to pay an outside contractor.

In addition, the ease of reporting, and the hastening of the process of responding successfully to incidents will bolster the reputation of the safety and community of on-campus housing. Retention of Resident Assistants will improve, property damage may be lessened, and demand might even increase for on-campus housing, which might raise revenue slightly.

Section 3: Current System Overview

3a. Current System Description

Currently, the system consists of resident assistants, who are student employees who report to Hall advisers and area managers. Resident assistants are expected to report incidents to area managers. An incident could be any event of note that takes place at

on-campus housing. Examples could include inappropriate pranks, property damage, malfunctioning restrooms, a conflict between residents, or even just a student who has been having a rough time who talks with the resident assistant. While a resident assistant could observe an incident by themselves, sometimes residents might call or text them to report something that happened or something that needs to be taken care of.

The BYU residence life incident report form is a Microsoft word document that is empty. It contains a table at the top for the reporting resident assistant to add names and other personal information of anyone who might be involved in any given incident. This allows management to contact these individuals if necessary, and also to store these records as part of a resident's personal file if necessary. In extremely rare cases, such practices can be useful in the case that a resident must be evicted and evidence of bad behavior or violation of the housing contract is needed.

Below the table of names is a blank space for the resident assistant to type what happened in the incident. The next blank space asks, "what did we do?" Here the resident assistant can detail what actions were taken in response to the incident. Lastly, is an area where the resident assistant can identify if housing leaders such as the area manager need to take action to resolve whatever issues have arisen.

Below is an example of an incident report. All incident reports follow the same format but could cover subjects much different than the one shown here:

<h1 align="center">Residence Life
Incident Reports</h1>

Date: 11/22/2021

Names	Student I.D.	Area	Building	Room/Apartment	Phone
COSMO COUGAR	Cosmo84	HL	G- Budge	2109	123-123-1234

What Happened?

Cosmo Cougar has been on early alert.

What did we do?

I (John Smith, RA) received a text on November 6th from a friend of Cosmo's that Cosmo was dealing with depression and his parents were concerned about him.   I (John) was able to talk to him later that day by knocking on his door and finding that he was in his room. I started a conversation and eventually asked how he was doing, in general, with school, etc. He said he was doing good, except for watching his favorite sports team lose that day. Since Cosmo was only telling me that things were good, I didn't want to pry or anything like that so I just ended the conversation with telling him to talk to me if he ever needed.

Recently, Cosmo has continued to appear on early alert but I haven't been able to have any good conversations with him.

Follow-up Needed?

I will continue to attempt to contact Cosmo periodically and build more of a relationship with Cosmo. Cosmo is probably the resident I have seen the least this semester and rarely see at all. Cosmo's family lives in Orem and he usually goes home for the weekend. He does not have a relationship with anyone in the hallway except for his roommate.

Person reporting John Smith

The resident assistant who wrote this report would save this word document as a new file with the date and description of the incident report in the name of the file on his computer. He would then open up his personal email and compose an email. He would address the letter to the area manager and would CC his hall advisor and perhaps any other Hall advisers who needed to be aware of the report. If the resident assistant then followed protocol, he would attach the incident report to the email and word make sure that in the subject line of the email he also described the incident report in the same way he did for the file name. If the resident assistant desires, He would write a short note to accompany the attachment. He would then send the email. If the resident assistant

followed proper protocol, he would then delete the incident report from his computer, due to the sensitive information that is contained in some reports.

The area manager has to check their email, scan it daily for these reports and has to make sure they read all of these emails and download the word documents that contain the reports. There doesn't seem to be a specific protocol for how managers handle these files. Typically they would save the files to a folder on their work computer, likely organized by date.

3b. Current System: Models and Diagrams

Use Case Diagram
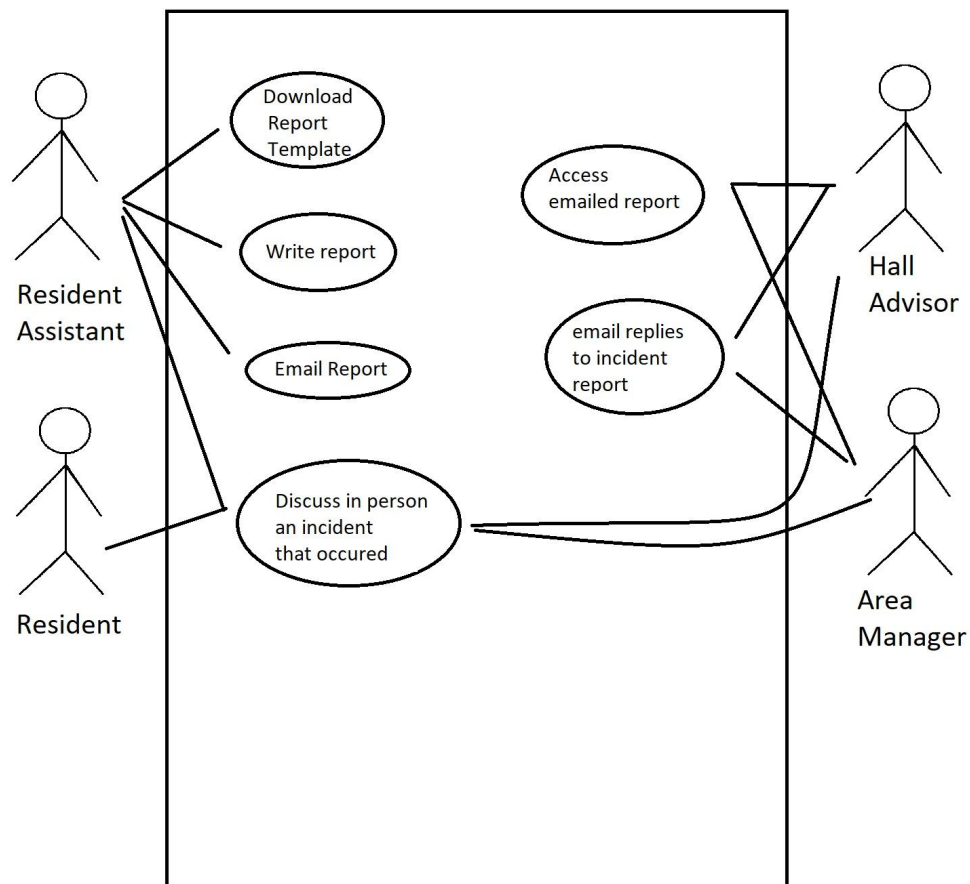
The figure outlines current system use cases and actors that interact with the system. The users of the system are Resident, Resident Assistant, Hall Advisor, and Area Manager. The Resident may discuss the incident that occurred. The Resident Assistance uses this and any other information to write an incident report by downloading the Report Template from the system and sending an email to report the incident. The Hall Advisor and Area Manager accesses the report received and email replies to the corresponding report.

"Submit Report" Use Case Description

This is a description of the process a Resident Assistant currently goes through when submitting a report. As you can see, it is presupposed that the Resident Assistant has access to the Word Document template.

Use Case	Submit an Incident Report to Management
Actor	Resident Assistant(patient)
Use Case Overview	The resident assistant submits an incident report using her personal email. She attaches the report and sends it to the necessary individuals, who include her Hall Advisors and Area Managers.
Trigger	Resident Assistant is made aware of an incident
Precondition 1	Resident Assistant has the emails of everyone she needs to send the report to
Precondition 2	Resident Assistant has the word document template needed to submit incident reports and has typed out the report

Domain Class Diagram
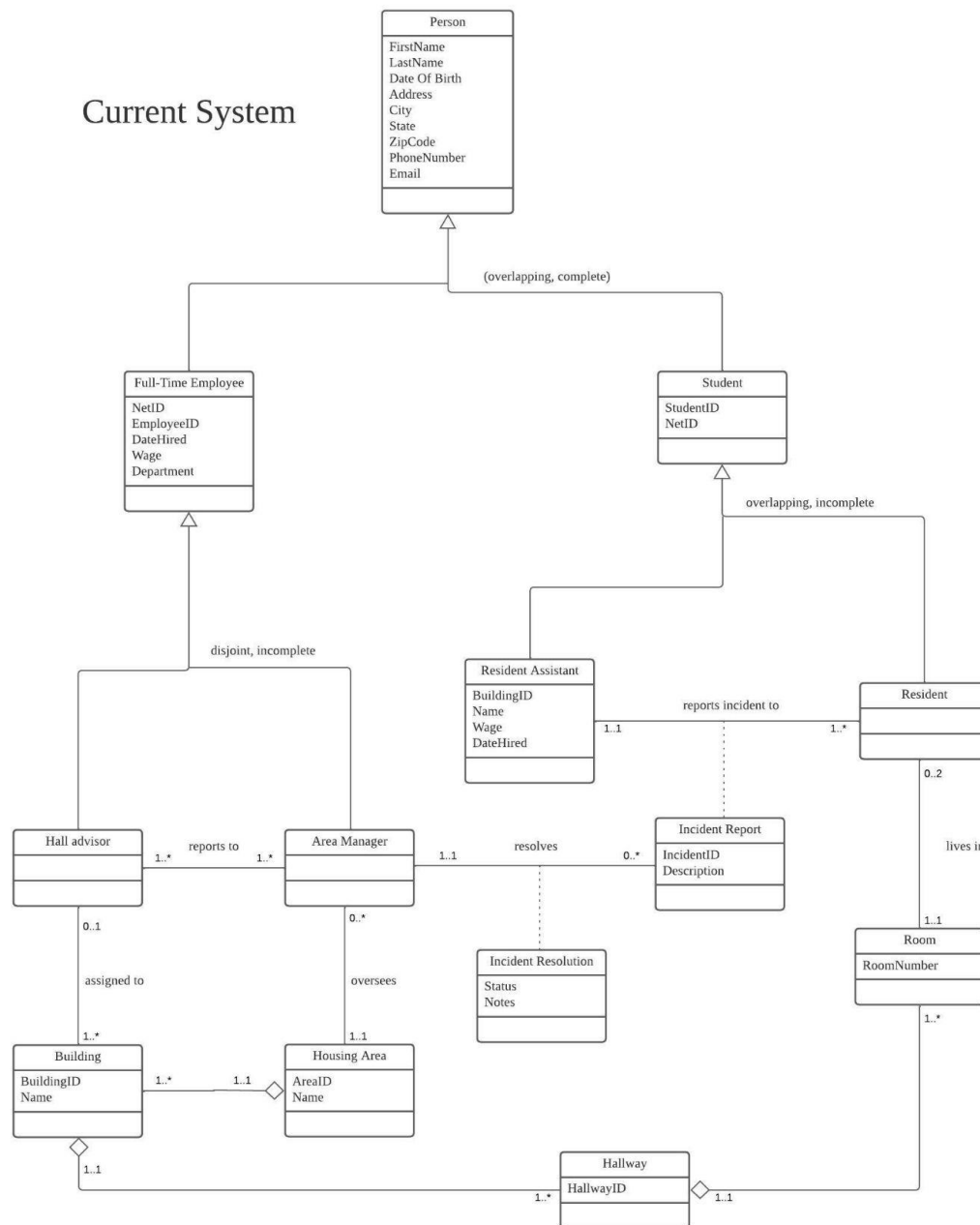
The domain class diagram is used to display the relationships between various data stored

about different classes of things. BYU's system tracks basic information about people,

more specifically, students and employees. All residents and resident assistants living at

BYU On-Campus housing are students. Residents have the ability to report an incident or

maintenance request to their assigned resident assistant, who then submits a report to the area manager. Various employees in the housing department are assigned to complete various tasks relating to the maintenance of certain buildings, as well as the resolution of certain incidents. The area manager is the employee in charge of resolving all incidents and updating the reports. Resident assistants serve as an intermediary between the area manager and the residents, as they have the ability to submit the reports and talk to the residents that filed them. Through this relational database, the system allows a variety of information to be accessed and used to achieve the objectives of employees, enhancing the service provided by BYU On-Campus Housing.

Section 4: Current System Analysis

What follows is our examination of the current systems that BYU On-Campus housing uses for reporting and managing systems. While the current system works to some degree, we still have the goal of improving its efficiency and effectiveness. In the previous sections, we gathered information about the current system. In this section we will identify any potential problems or areas for improvement, and in the next section we will develop solutions to address these issues. In discussing potential problems or areas for improvement, we specifically are looking for inefficiencies or bottlenecks in the system, examining the accuracy and reliability of the information being generated, and identifying areas where users are not satisfied with the system.

One system inefficiency is that the RA has to use a word document template that is hard to get sometimes, and for this template to be updated would require housing managers to send out an email to every RA.

A second system inefficiency is that the RA has to attach the necessary recipients to the email they send. It's easy to see how they could miss someone important or get the email address wrong. One Resident Assistant confidentially described to us a co-worker who left off a certain Hall Advisor from all of his emails simply because of a dislike for that Hall Advisor.

A third system inefficiency is that in general, the process of sending these emails tends to become a huge bottleneck. Housing managers expressed concerns and frustrations about

Resident Assistants who procrastinate greatly in filling out these reports, and because they are sent via email they are then considered as occurring on the date the report was emailed instead of the date that the incident actually occurred.

Another inefficiency is that residents have no real way to report things. While they can text or call Resident Assistants and ask them to report things, there is no real way to make sure that such things are ever being taken care of, which in certain situations could create anxiety for residents.

A system potential for inaccuracies and unreliability is that people who are listed on the report are put there by Resident Assistants. While Resident Assistants have access to BYU housing's database of persons, they have to copy and paste such data into the incident report Word document, leaving open obvious possibilities for mistakes and typos.
Areas where users are not satisfied are quite numerous. In general, a big concern with the reporting process is the perception that reports seem to get "lost in the weeds", that is, an issue that is important and pressing to an area of on-campus housing may be reported on, but the ability for residents and Resident Assistants to know if an issue is being followed up on is minimal. When issues are resolved, if Resident Assistants or anyone is ever informed, if it all, it is only by word of mouth.

In general, problems observed with the system also include the fact that there is no way to ensure that Resident Assistants actually delete the Microsoft Word files of the reports they write off of their computer. While it may not seem harmful for these employees to have

access to reports they wrote, there is potential for friends or family who also use their

personal computers to see these files, which can result in serious privacy violations

(possibly, depending on the situation, violating laws such as FERPA).

In addition, using email to file these reports is also problematic. Email is not reliably

secure as it entails files and messages being sent over network equipment the user neither

controls nor has any visibility of. The fact that there is no requirement for employees to

use their BYU-issued email addresses only compounds the security issues here. This

means that employees, long after they have left their job and even the university, will likely

still have access to old reports they submitted. For important financial and university

information that is given to students, BYU uses messaging services that are handled

internally such as Y-message, yet BYU on-campus housing uses personal email servers for

its incident reports that can contain extremely sensitive information.

In conclusion, sending incident reports over email can be cumbersome, lacking in

thoroughness, and unsecure.

Section 5: New System Proposal

5a. System Requirements

We propose an internal portal be developed, accessible through the BYU on-campus

housing website, be developed. We call it the "Incident Management System" (IMS).

This IMS portal is a portal from which one can file reports of the following kind:

- Violation Reports: includes reports of incidents rule violations or dangerous

  situations

- Early Alert Reports: reports students on "early alert" list (those on watch for

  academic or other issues)

- Maintenance Reports: reports maintenance issues within the building

This portal has the following abilities:

- Allows residents to submit a report

- Allows RA's and residents to see the progress made on resolution of their reports

- Links BYU housing's database of persons, which makes reporting and classifying

  the reports easier (i.e. see and sort all reports associated with a given person)

By implementing the new solution, we expect several issues to be resolved. First, since all

reports are organized and stored in one place, this will reduce time taken to respond to

incidents and ease communication between involved parties. Second, because the

Incident Management System would be hosted by BYU, it is more secure than email and

will require two-factor authentication, which will increase security and therefore reliability

of the reports.

## 5b. Proposed System: Models and Diagrams
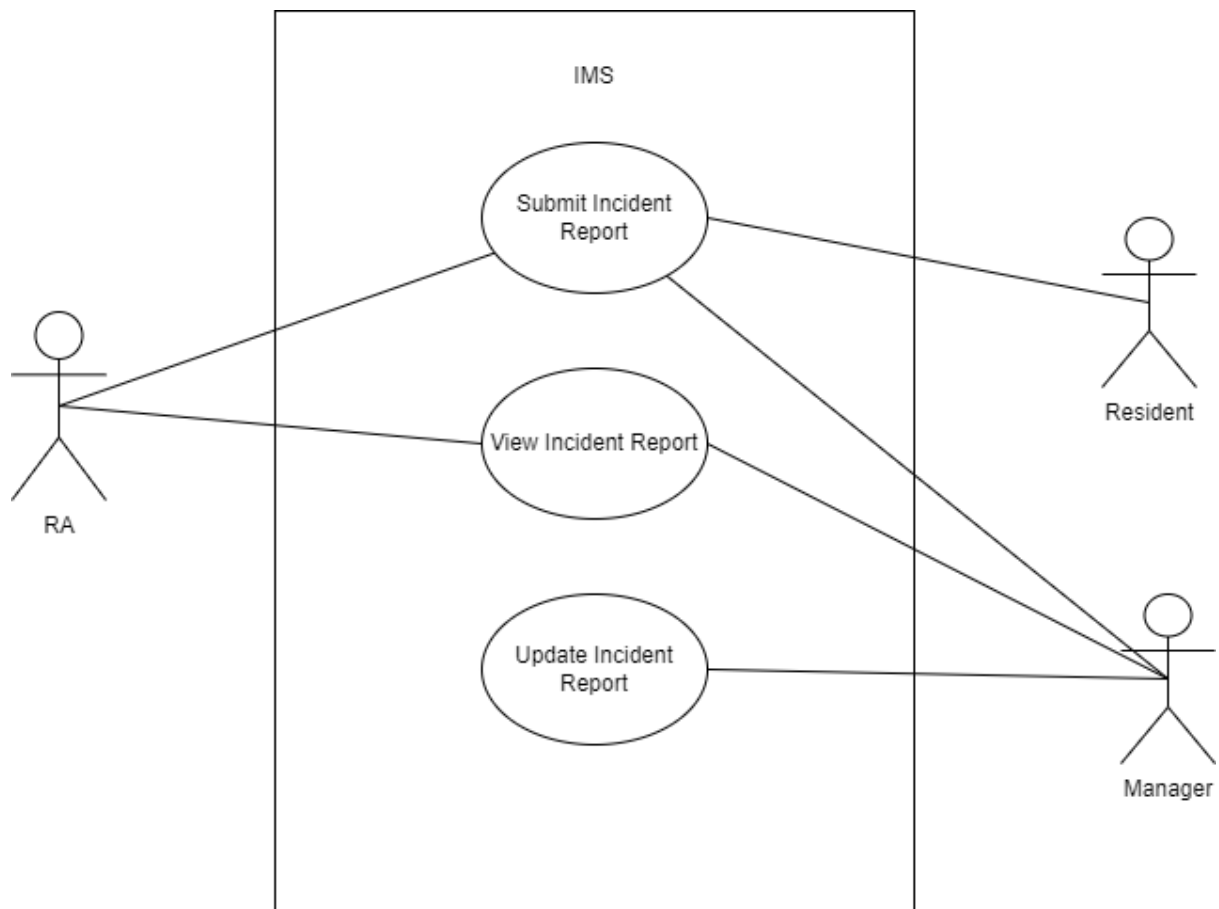
The proposed use case diagram includes three use cases invoked by three separate actors.

The first use case can be invoked by all actors. This is the "Submit Incident Report" use

case. The second use case is "View Incident Report." Only RA's and Housing Managers can

view incident reports. Finally, only a manager can invoke the last use case. This is "Update

Report," where a manager can update the report as it is investigated and note what actions

they took to resolve a case.
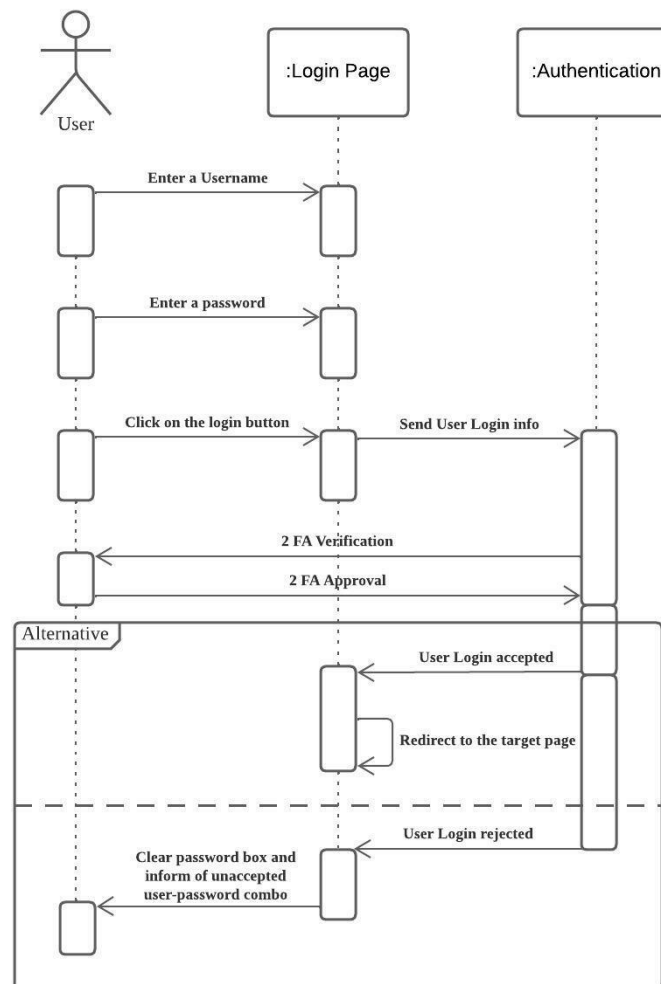
This system sequence diagram illustrates the sign-in process, which has two-factor

authentication. This chart illustrates the heightened security that our proposed system

will provide, as contrasted with the current system, the security flaws of which we have

discussed at length.
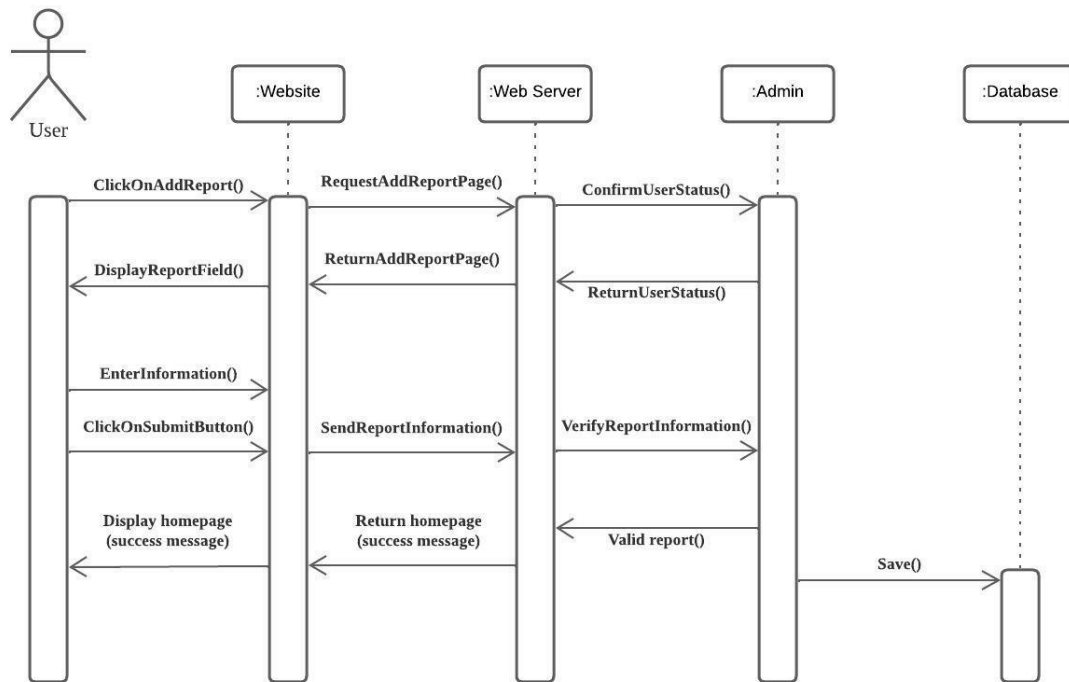
This system sequence diagram describes the process of how a user interacts with the

Incident Management System. When the user has been logged into the website, they can

choose to add a report to the system.

Based on the status of the user, (whether they are an employee such as an RA or simply a

student), they are given a form to report on an incident. RA can enter more information

than students can as they are filing a formal report. The user can then submit the form

that contains the report and it is saved in the database.

Resident	Resident Assistant	Area Manager
Reports Incident	Receives Report	Receive Incident Report
	Creates and writes incident report	Acts on Report
	Submits Incident Report	Updates Report Status
	Receives update on report	Determine Need-to know Status
Receives updated report status		Archives report

RA given access / RA not given access

Resident given access / Resident not given access

Residents can report an incident that occurred, and this alert is transferred to their Resident Assistant, who can then fill out a more formal and thorough incident report. The Resident Assistant then submits this report through the portal and the Area manager is notified, and he can view it. The Area manager can take any actions he deems necessary on the report, and he can then update the record as necessary, often by changing the status to "resolved". The area manager can also control the visibility of the report. If the report contains sensitive information, he can keep it hidden from users with a lower-level clearance. If not, those who are attached to the report have the ability to see what actions were taken and which issues were resolved.

This wireframe represents the incident reporting form. Here, residents and RA's alike can submit a report. This wireframe specifically shows what is available for an RA. A resident would not have the "What did we do," "Follow-up needed," and "Persons Involved" fields. Since residents are not trained employees, this makes the reporting process easier for them and encourages reporting. It also would not make sense for non-employees to prescribe action when they are not trained in proper responses, or for them to have taken action to respond to issues when they are, again, not trained. For privacy reasons, they are not allowed to access the database of persons.

5c. Proposed Domain Class Diagram
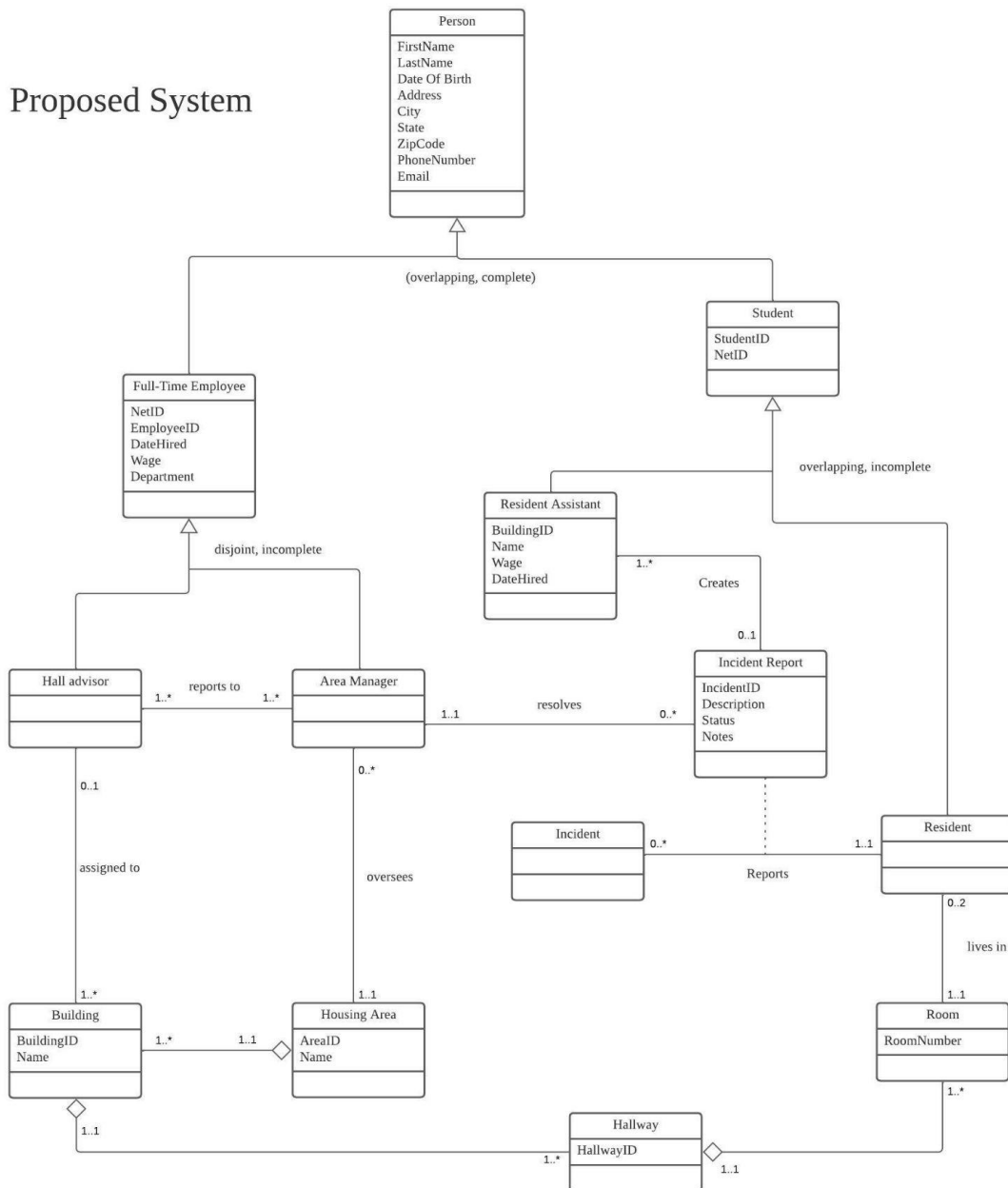
The proposed domain class diagram for BYU On-Campus Housing incident management

system allows residents to submit reports to the system instead of having to do so through

the resident assistant. For any incident or maintenance request, residents can create a

report with a description of the problem inside their resident portal. Resident assistants can then investigate the incident and add any additional information to the report that is needed. Because the incident status is an attribute of every report, residents can view the status and have an understanding of when the issue will be solved. This allows for streamlined communication between the residents and area managers, all through an automated system. Storing information this way will allow BYU to improve their resident experience by giving students the opportunity to be involved in the resolution process and making the information more available across the board.

5d. Project Plan for Implementation

By following the class diagram and the other diagrams we have provided, we can create an appropriate system with the proper requirements. We recommend following these steps:

1. The first step would be to take the proposed diagrams and design the system according to the requirements set. This would include creating a structure for the database and also creating templates for the website.

2. The second step would be to create the relational database according to the domain class diagram.

3. Next, the system needs to be created. This would follow the use case and activity diagrams to create the actual system.

4. Following system creation, the database, and the system need to be integrated. They need to be connected to each other so that the system can read and update the database.

5. In the testing phase, there are several tests that need to be run:

   a. Unit testing - This includes checking the basic functionality of the system.

   b. System stress testing - This tests the functionality and non-functionality of the application, including load times and other stress points for users.

   c. User acceptance testing - Next we turn to the users. The following are suggested tests the potential users could perform.

      i. Person input

      ii. Room information input

      iii. Test Incident Report

6. After testing, the recommendations made need to be implemented as improvements.

Section 6: Appendix

Current Forms and Reports

Figure 1a

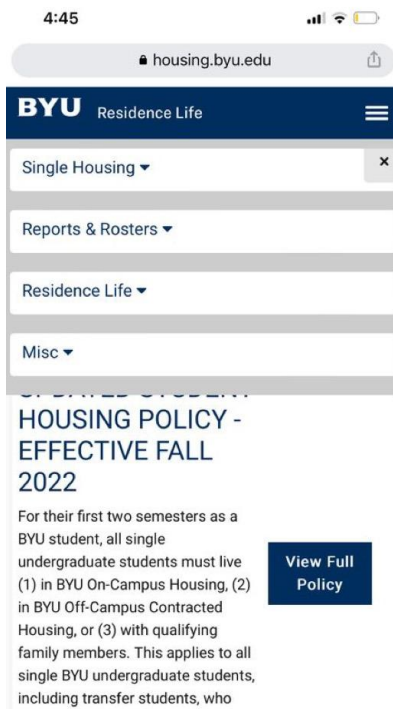Housing portal on housing.byu.edu when logged in

Figure 1b

Admin tab in the portal

When viewed by an employee, they have access to various administrative tools. Our

Incident Management System could be integrated into this system under "reports and

rosters".