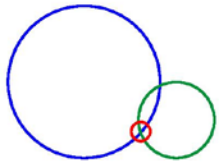

STUDENT IT ARCHITECTURE COMPETITION - III

RECOGNIZING AND PROMOTING THE ART AND SCIENCE OF IT ARCHITECTURE

# Architecture Design Document
# Part II


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# 1. OVERVIEW

This document outlines the software architecture, user experience/interface architecture, security architecture, infrastructure/deployment architecture, and technology stack for the proposed IT solution for F2E.

We considered a wide range of possible solutions and ultimately, narrowed it down to two feasible solutions. We examine these two solutions in the following sections: Security Architecture, Infrastructure/Deployment Architecture, Technology Stack, and in our Execution Plan. At the end of our Execution Plan we make a final recommendation about what solution will better help F2E advance its mission more efficiently and effectively.

# 2. SOFTWARE ARCHITECTURE

The software architecture for the solution captures the high-level logical components of the IT system. This system includes three components, the mobile application, the website and backend application.

## 2.1 Components Diagram

In this part, we depicts the main components of the software system. The website and mobile application are depicted above the dotted line, and all elements below the dotted line are a part of the backend application. Each of these components have been expanded to include more details. Descriptions of these details can be found in a table below the components diagram.

*Figure 1: Components Diagram*

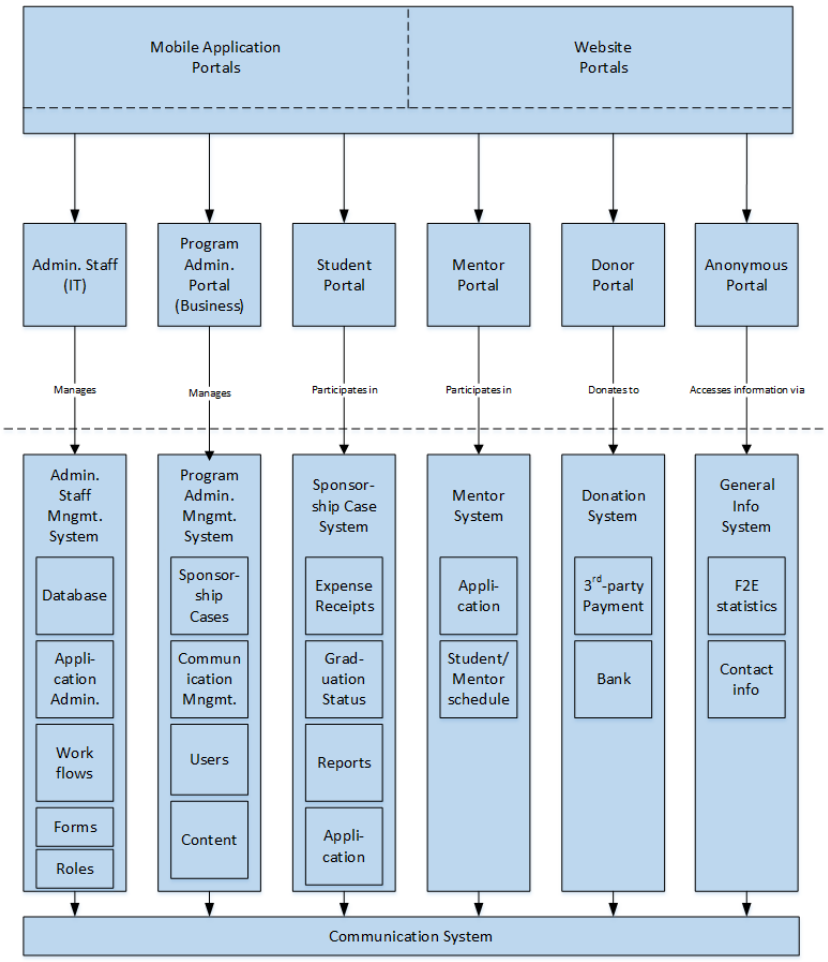


*Table 1: Software Components*

| Component | Description | Key Non-Functional Qualities that are relevant |
|---|---|---|
| **Mobile Application Portals** | This is the mobile application user interface for all user groups to access. From this portal, users can access general information on the mobile application UI, register, or log in to the portal that corresponds with their role (excluding anonymous users). | -Maintenance schedule<br>-Availability<br>-Security<br>-Usability |
| **Website Portals** | This is the website user interface for all user groups to access. From this portal, users can access general information on the mobile application UI, register, or log in to the portal that corresponds with their role (excluding anonymous users). | -Security<br>-User experience<br>-Performance |
| **Administration Staff Portal (IT)** | Upon log in, the Administration Staff Portal will be accessed only by those in a staff role that maintain the database and IT related-business. The Administration Staff Portal has access to the database, to maintain, update, and manage the database. In addition, this system will manage the mobile application administration, workflows, forms and roles. The Administration Staff Portal also has access to the Communication system, where staff can send and receive emails. | -Usability<br>-Security |
| **Program Administration Portal (Business)** | Upon registration and log in, the Program Administration Staff Portal will be accessed only by those in a staff role that maintain the business side of F2E. The Program Administration Portal has access to the program administration staff management system, where F2E management actions occur, such as managing sponsorship cases, communication, users, and content. The Program Administration Portal also has access to the Communication system, where staff can set-up auto-reminders and mass emails. | -Usability<br>-Security |
| **Student Portal** | Upon registration and log in, the Student Portal will be accessed only by those in a student role. The Student Portal has access to the Sponsorship Case System, which keeps track of a student's sponsorship track, progress, reporting, etc. In addition, the student portal allows students to submit their required deliverables, such as expense receipts and reports. The Student Portal also has access to the Communication system. | -Usability<br>-Security |
| **Mentor Portal** | Upon registration and log in, the Mentor Portal will be accessed only by those in a mentor role. The Mentor Portal has access to the mentor system, which includes an application and schedule management for student-mentor meetings. The communication system allows mentors to be in contact with F2E staff and with students that they are mentoring. | -Usability<br>-Security |

| | | |
|---|---|---|
| **Donor Portal** | Upon registration and log in, the Donor Portal will be accessed only by those in a Donor role. The Donor Portal has access to the donation system and the Communication system. In addition, Donors are subscribed to receive annual reports about the students whose education they donate to. | -Usability<br>-Security |
| **Anonymous Portal** | The anonymous portal is open to the general public and requires no registration or login. Instead, all anonymous users can view any public information on the F2E website and app. The Anonymous Portal also has access to the Communication system, for asking questions to F2E staff. | -Usability<br>-Security |
| **Administration Staff Management System** | The Administration Staff Management System represents the system that IT staff interact with. That is, this system houses the management capabilities for maintaining the database, mobile application, workflow, roles and forms. | -Usability<br>-Security<br>-Agility |
| **Program Administration Management System** | The Program Administration Management System represents all managerial actions and responsibilities related to business that a F2E staff may hold. For example, the staff will manage sponsorship cases, which represents all aspects of a student's profile. In addition, the administration system includes updating content of the website and mobile app, and users. | -Usability<br>-Security<br>-Agility |
| **Sponsorship Case System** | This system manages all sponsorship cases. A sponsorship case represents all aspects of a student's profile with F2E. A sponsorship case includes: funds allocated towards a student's education, deliverables turned in by a student, and ends with closing a sponsorship case at the time of graduation. | -<br>scalability<br>-Usability<br>-Security<br>-Flexibility |
| **Mentor System** | The mentor system manages all aspects of a mentor's job, from the initial application to scheduling and communication between students and mentors. | -Usability<br>-Security |
| **Donation System** | The donation system handles all financial transactions for F2E. This includes when a donor donates, student tuition is paid or when funds are transferred to a student's bank account. This system works with the 3rd-party payment system and the financial institution. | -Security<br>-Usability |
| **General Information System** | The general information system represents all public information that is viewable by anonymous users. This includes a point of contact, where anonymous users may ask questions to learn more about F2E. | -Usability<br>-Security |

## 2.2 Layered View of F2E IT System

In this part, we provide a different angle to look at F2E IT System: the layered view. The following figure provides a layered view of F2E IT solution components. In addition, below the diagram, a table is provided with descriptions of the diagram and its components.

*Figure 2: Layered View of F2E IT System*

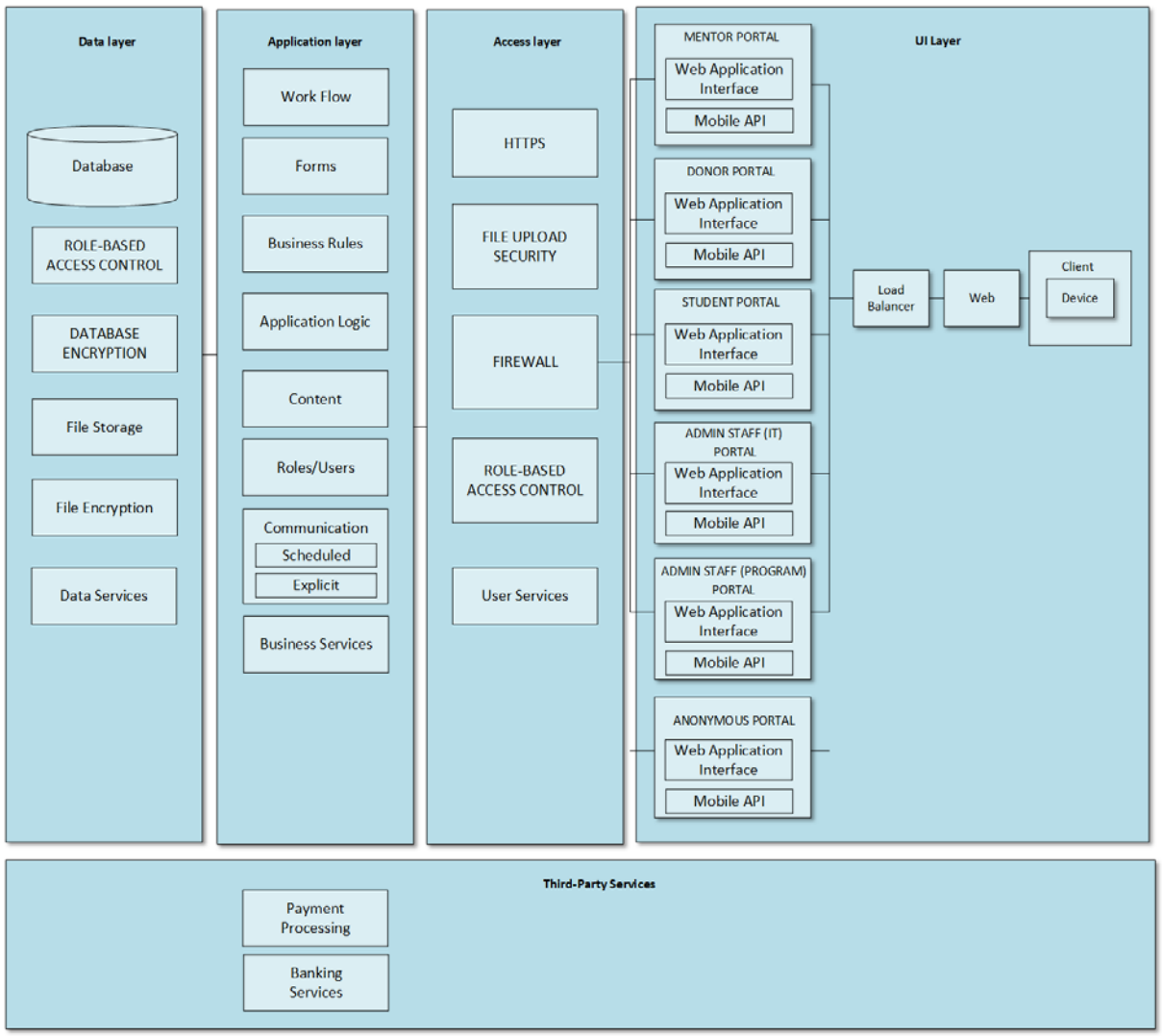


*Table 2: Description of Layered Components of F2E*

| Component | Description |
|---|---|
| **Data Layer** | Data layer includes the database and file storage. The database will hold all of F2E's business data including student, mentor, and donor records. It also includes a file storage that will hold, among other files, PDF documents submitted in reports. In order to maintain the data security, there will be database and file encryption as well as role-based access control. Data services will provide a link to access the data layer. |
| **Application Layer** | Application layer includes work flow, forms, business rules, application logic, content, roles/users, explicit and scheduled communication, and business services. |
| **Access Layer** | Access layer includes HTTPS, file upload security, firewall, role-based access control, and user services. This layer is security focused to ensure only legitimate users access F2E's applications. |
| **Presentation Layer** | Presentation layer includes portals for mentors, donors, students, IT admin staff, program admin staff, and anonymous users. It also includes a load balancer to ensure smooth delivery of web and mobile content to end-users. |
| **Third-Party Services** | This includes payment processing and banking services. Payment processing will handle online donations and they will be deposited in the banking service. |

# 3. USER EXPERIENCE / INTERFACE ARCHITECTURE

User Experience / Interface Architecture is a key part of modern IT architecture design. A good User Experience / Interface Architecture will strive to accommodate the needs of different users, be user-friendly, and enhance the main functionality of the IT system. In this section, we offer several different ways to describe User Experience / Interface Architecture of F2E IT system.

## 3.1 Key Processes Flow Diagrams

In this part, we identified several key processes of the F2E IT system. We illustrate each process in a flow diagram. A description of each flow diagram is provided in the table below the flow diagrams.

*Figure 3: Registration, Login, and Forgot Password Flow*

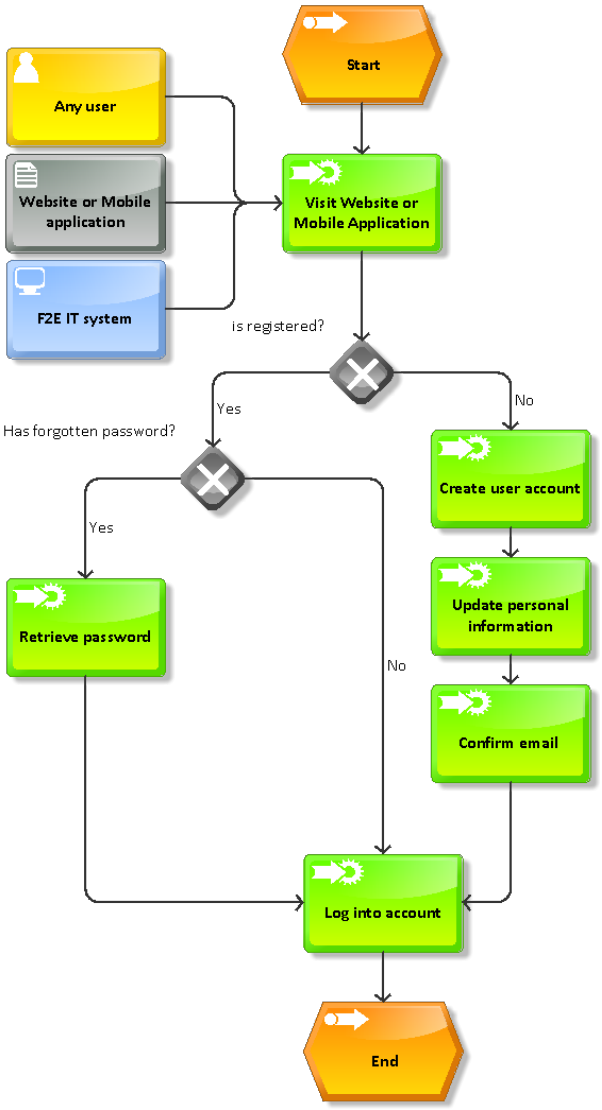


*Figure 4: Manage Donation Flow*

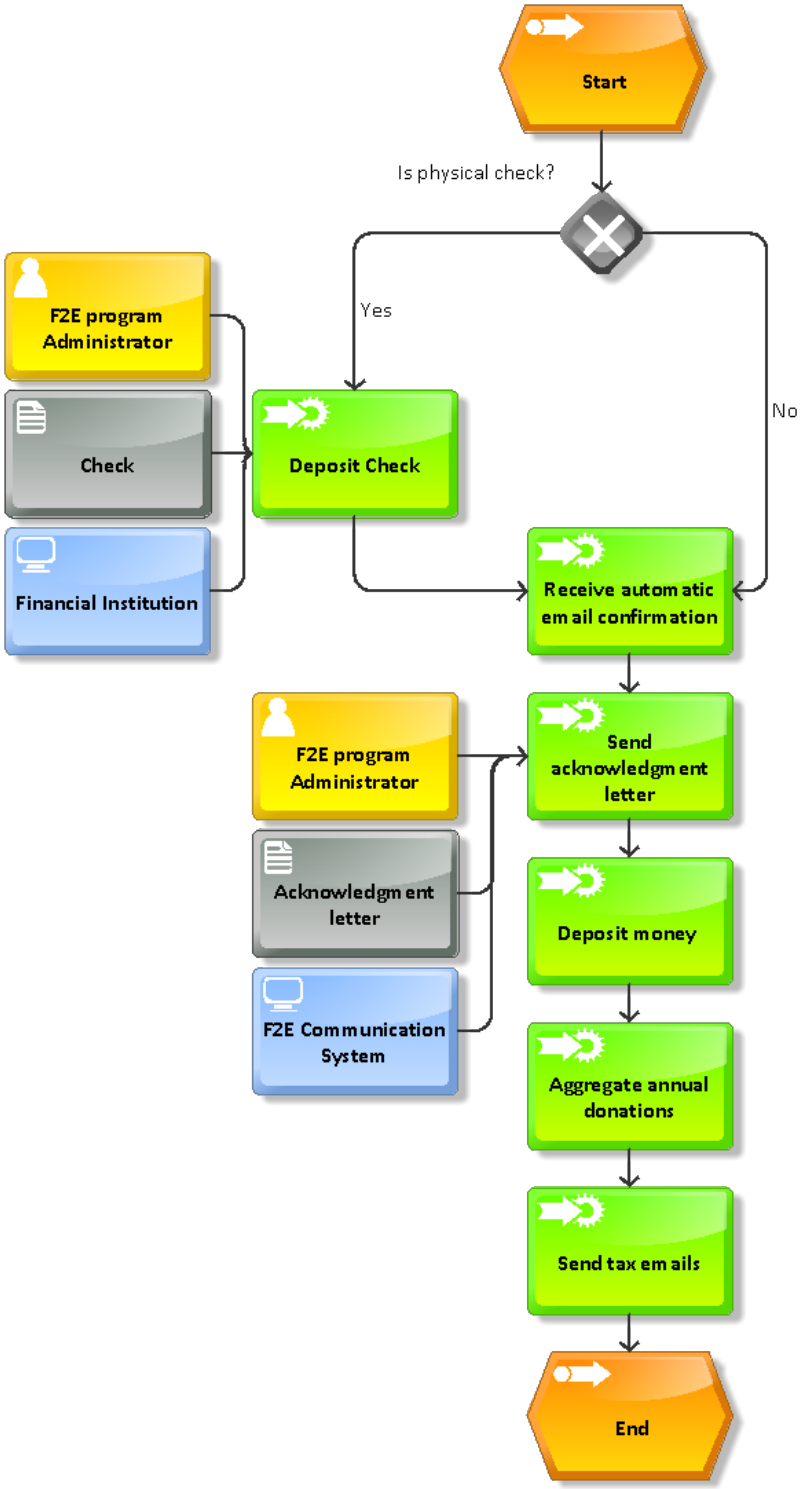


*Figure 5: Review Application Flow*

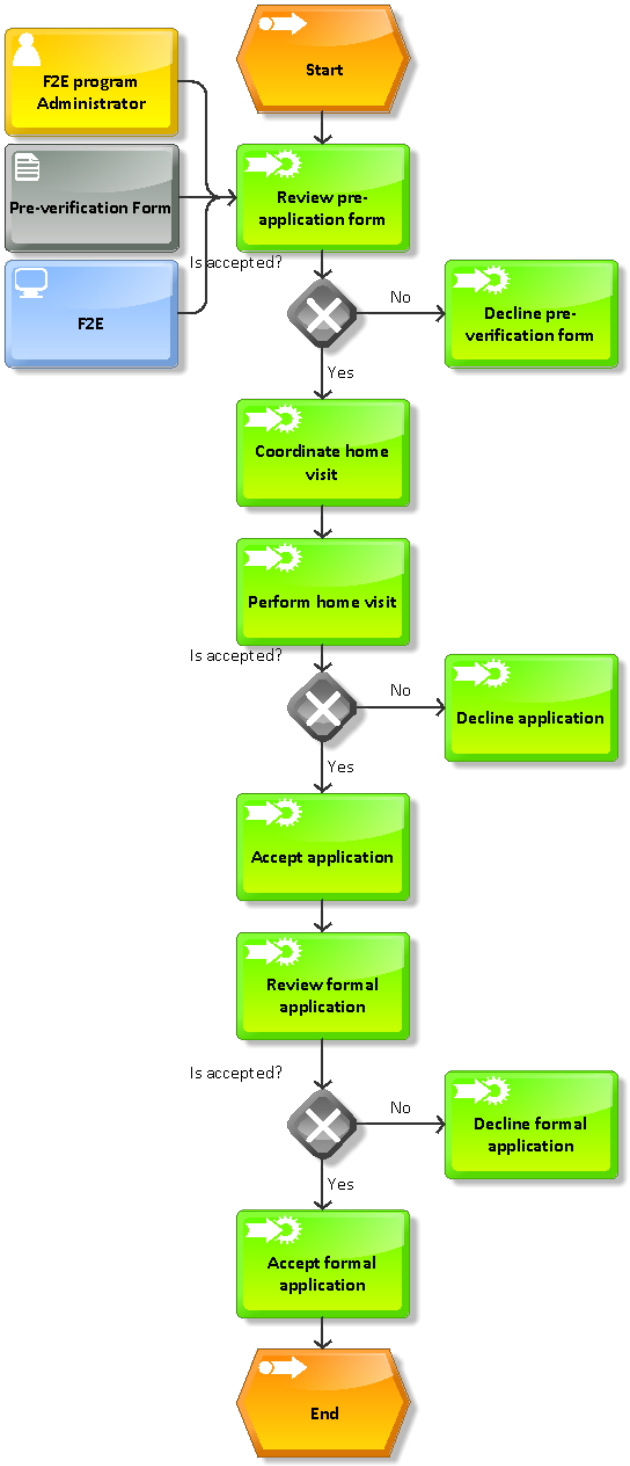


*Figure 6: Manage Sponsorship Case Flow*

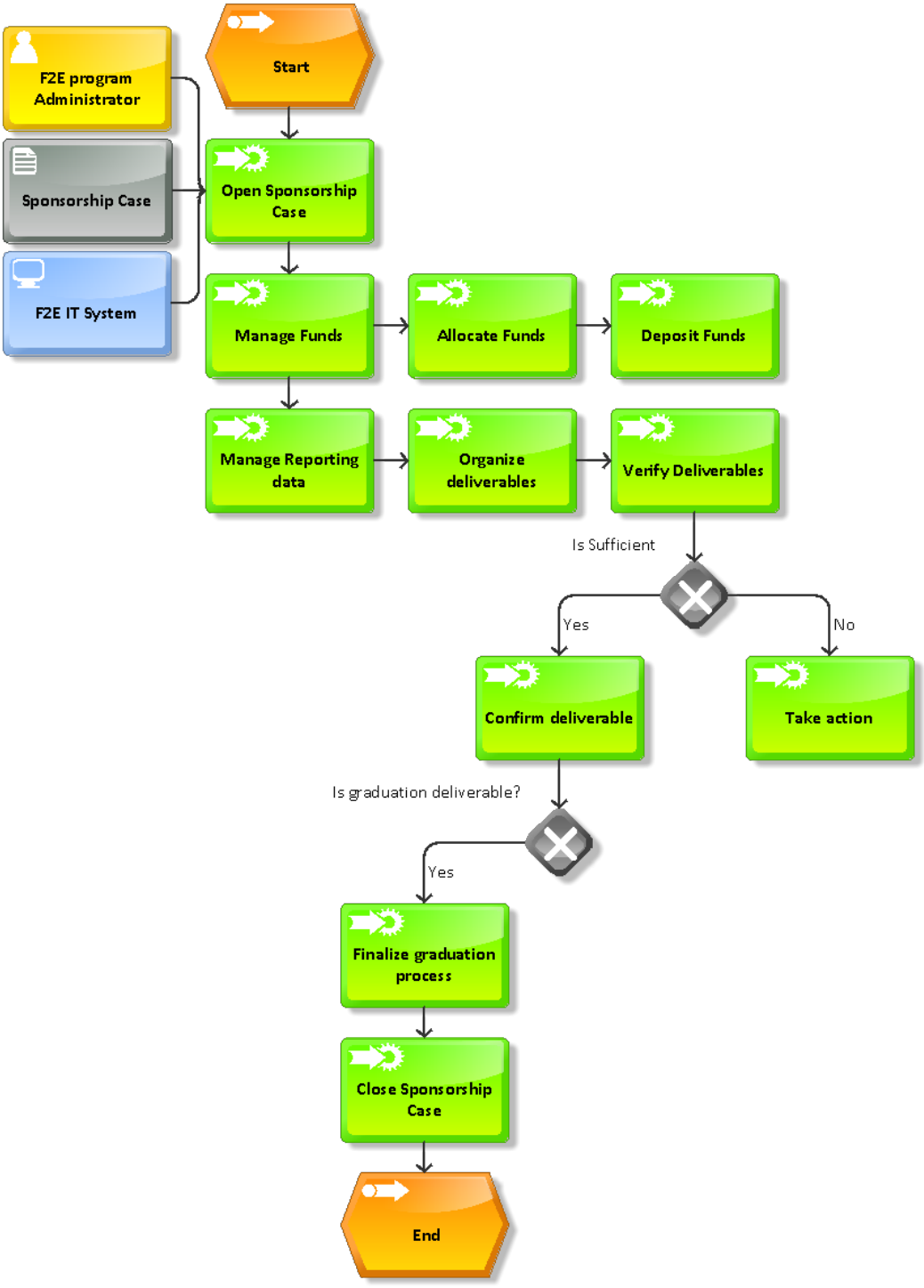


*Figure 7: Submit Document Flow*

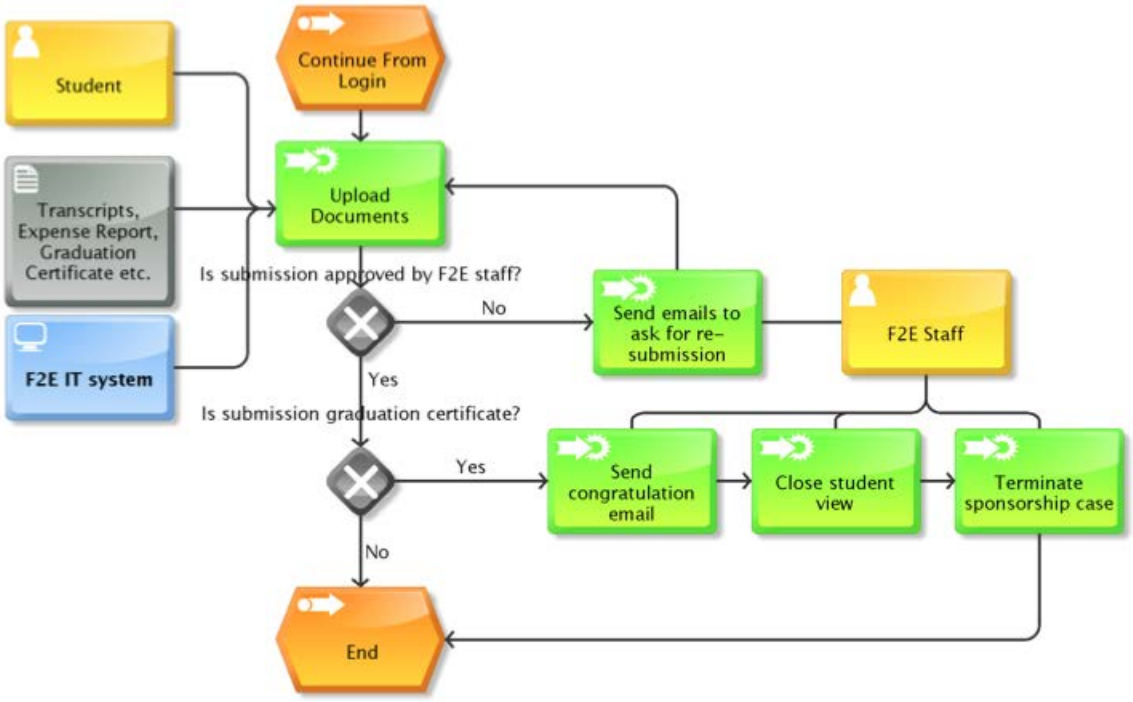


*Figure 8: Donate Flow*

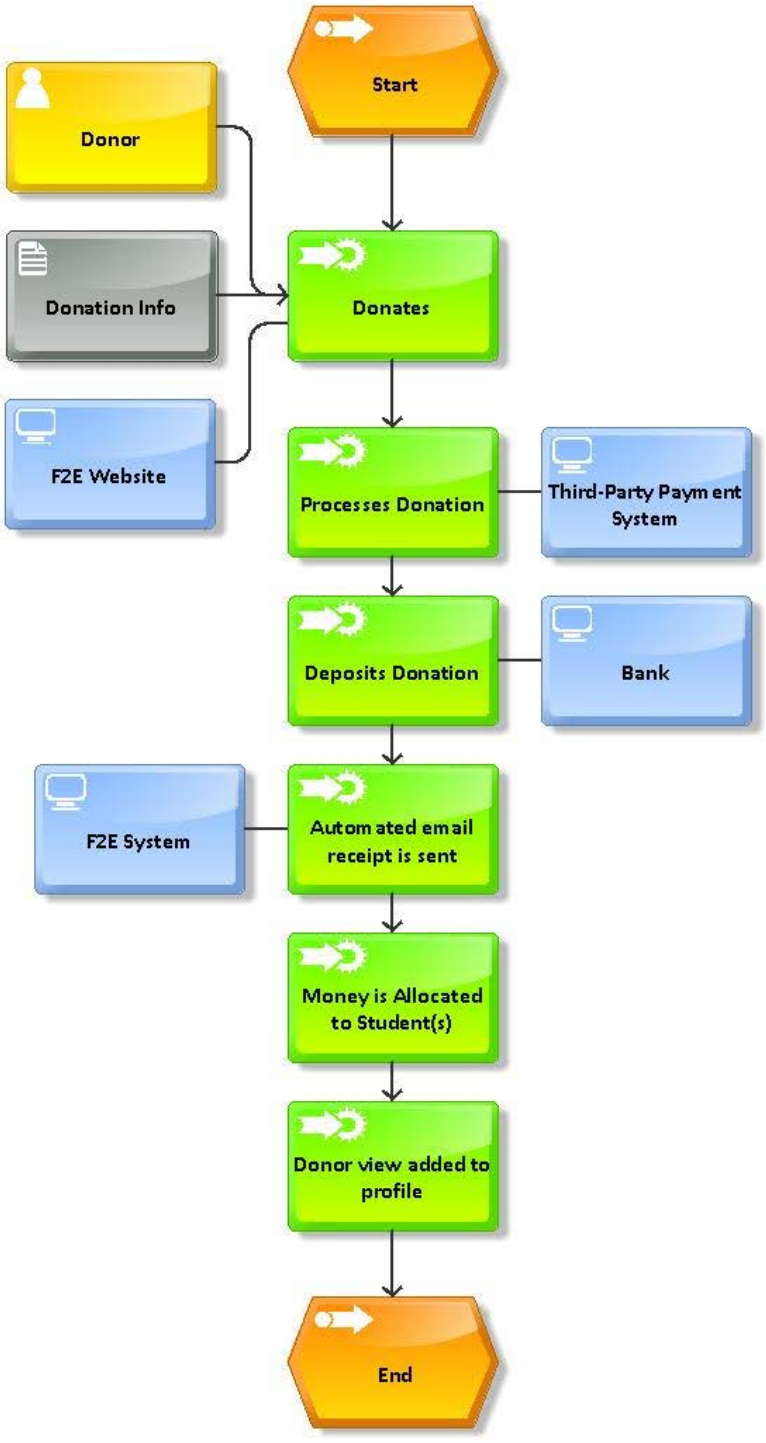


*Figure 9: Mentor Flow*

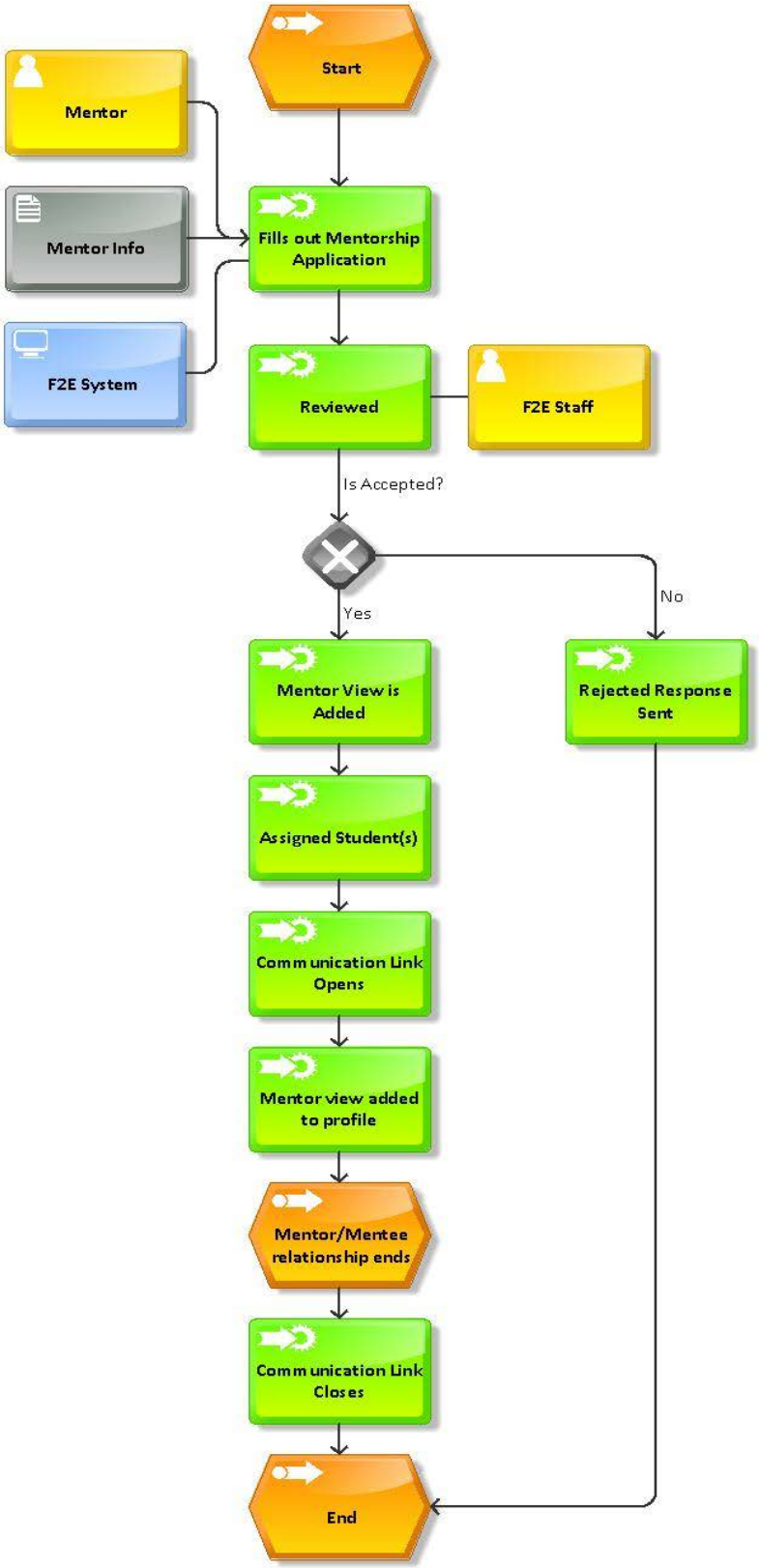


*Table 3: Description of Flow Diagrams*

| Roles | Diagram Figure Number | Sub-process | Description |
|---|---|---|---|
| **All** | 3 | Registration, Login, Forgot Password Flow | This process flow is available to all users, excluding the anonymous users; once an anonymous user creates an account he/she is no longer anonymous, but instead is classified as a user of the system. This process depicts how a user would register and log in to the system via the website or mobile application. This flow also shows how a user would retrieve a password if it is forgotten. Also, users who attempt to log in and have yet to register will be redirected to create an account before logging in. |
| **Staff** | 4 | Manage donation Flow | Donations may be received as either a physical check, where staff must deposit it, or as an online donation, where it is directly deposited into the bank. Once the donation has been received and deposited, an automatic confirmation email and receipt will be sent to the donor. In addition, the acknowledgement letter will be mailed to thank the donor. Once a year, at the end of a business life cycle, donations will be aggregated for each donor so that tax emails may be properly sent. |
| **Staff** | 5 | Review application Flow | This flow depicts how student applications are reviewed. The student flow has a two-step process which includes the pre-verification process and the formal application process. When a student passes both application rounds, he/she is accepted into the program and a sponsorship case is opened for the student. |
| **Staff** | 6 | Manage sponsorship case Flow | Each student will have a sponsorship case and it is the staff's responsibility to manage all cases. Staff will manage each sponsorship case by managing funds, managing reporting data and closing the sponsorship case upon graduation. With managing reporting data, the deliverable turned in by students must be verified for validity. If the deliverable is valid, it is checked off as "turned in". However, if the deliverable is insufficient the staff will need to take action. The action taken depends on the situation and deliverable. For example, if a student is late to turn in grade reports, staff may need to give a reminder or warning. In addition, if a transcript deliverable is forged, staff may need to contact |

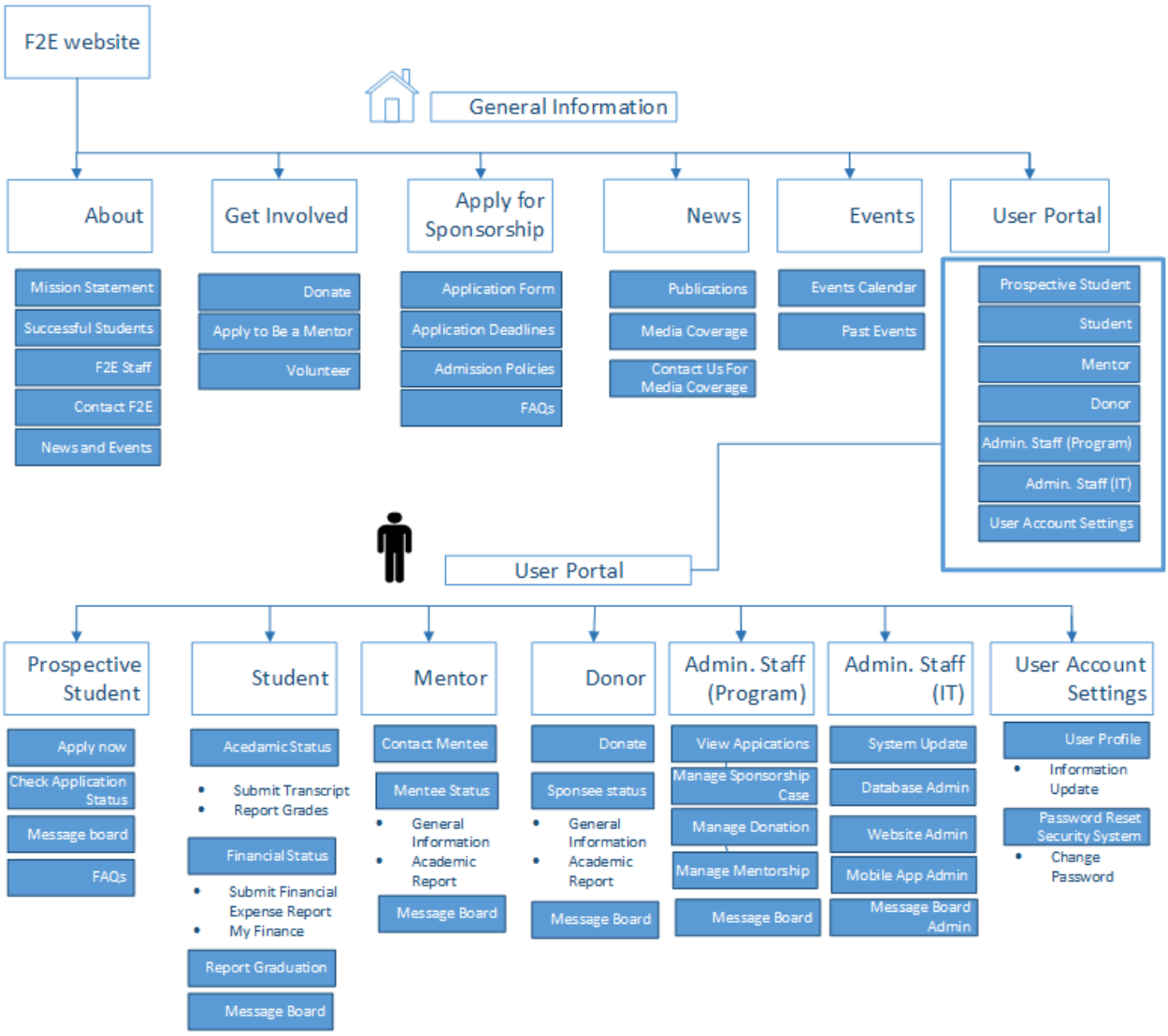
| | | | |
|---|---|---|---|
| | | | the education institution and student. Each situation will be handled based one F2E's rules. |
| **Student** | 7 | Submit Document Flow | Sponsored students need to submit deliverable documents to maintain their sponsorship status. Documents include, but not are limited to, transcripts, financial expense reports, and graduation status. Once the documents are submitted, F2E staff will determine whether the submission is valid and update the student's sponsorship case accordingly. |
| **Donor** | 8 | Donate Flow | Donors have the option to donate funds online or by sending a check. If the donation is made online, the donation will be processed by the third-party payment system. If the donation comes in the form of a check, the donation will be deposited to the bank. Once a donation has been processed, the donor will receive an email with a receipt. The donation money will be allocated to a sponsor student. |
| **Mentor** | 9 | Mentor Flow | A potential mentor will begin by applying to F2E. If he/she is accepted as a mentor, he/she will have access to the online mentor portal. A mentor will be assigned student(s) and a communication link will be opened between the mentor and mentee(s). Once a mentor/mentee relationship link ends, formal communication between the two will be closed. |

## 3.2 Website Sitemap

This section provides the sitemap that shows the pages and screens that make up F2E's website. F2E's website access is divided into a general information component and user portal component. The general information component is open to the public and provides information about F2E, details about how to apply for sponsorship, a link to donate, etc. The user portals require a username and password to access and provides different functionalities to different user roles.

The top half of the figure below illustrates information provided to the general public by F2E website, while the bottom half provides a detailed illustration of the user portal provided by F2E website.

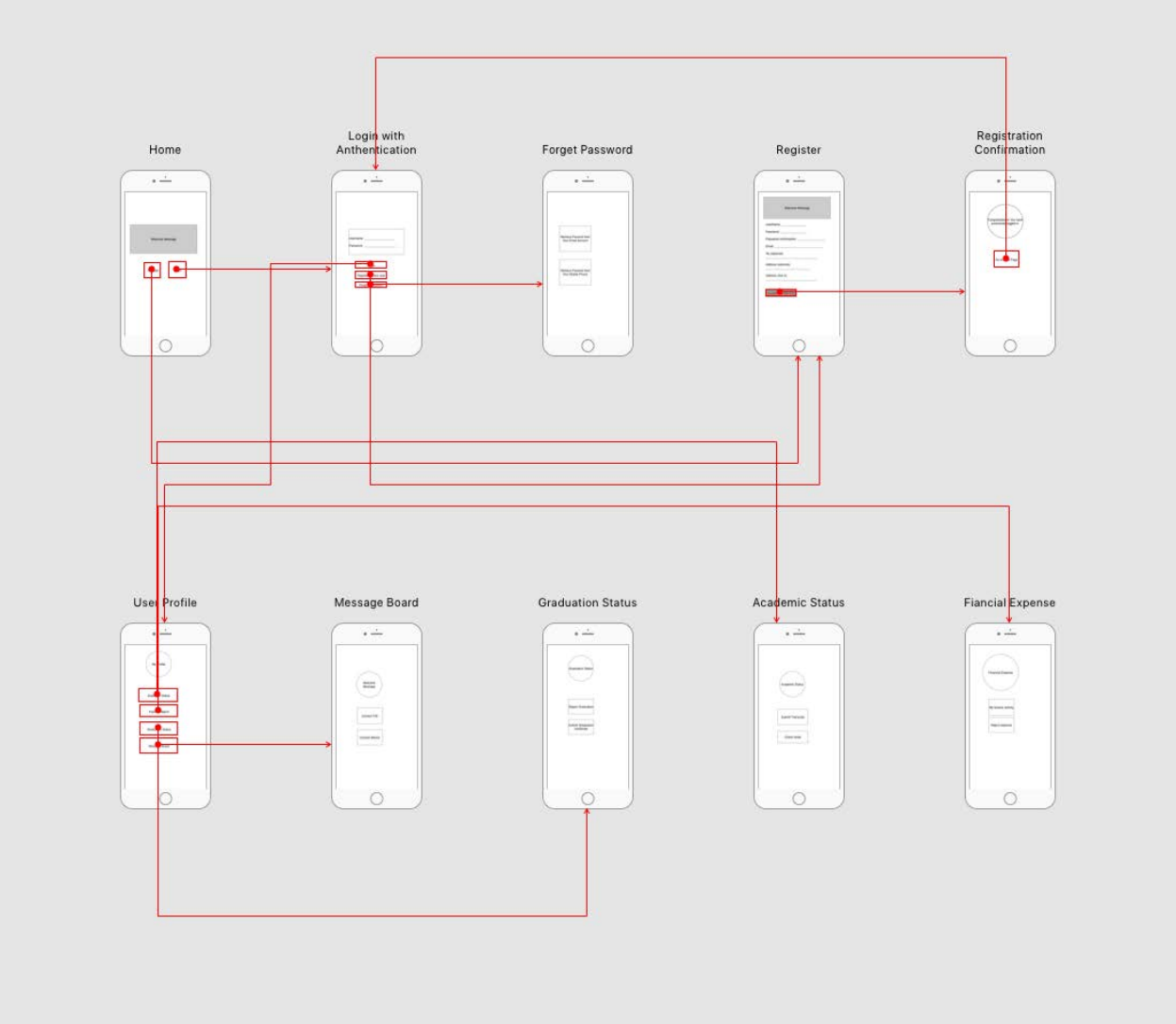
*Figure 10: Website Sitemap*




## 3.3 Mobile App Wireframe

This part includes a mobile wireframe diagram to show the user interface of the F2E mobile app. Unlike the F2E website, the F2E mobile app is designed to achieve essential functionalities of F2E while maintaining simplicity. Therefore, we decided to only keep the user portal component in the mobile app. This example outlines the view for a student. The student view is depicted because this view is one of the more complicated flow processes within F2E.

*Figure 11: Mobile Wireframe Diagram_ Student View*




When a student opens F2E mobile app, he/she will be directed to either the login page or registration page. On the registration page, he/she will have the Option to retrieve her password. Once logged in in, he/she will see her profile. A  profile for a student is divided into four parts: academic status: where he/she can report grades; financial expenses: where he/she can report financial expenses; graduation status: where he/she can report graduation status; and message board, where he/she communicates with F2E staff and mentors.

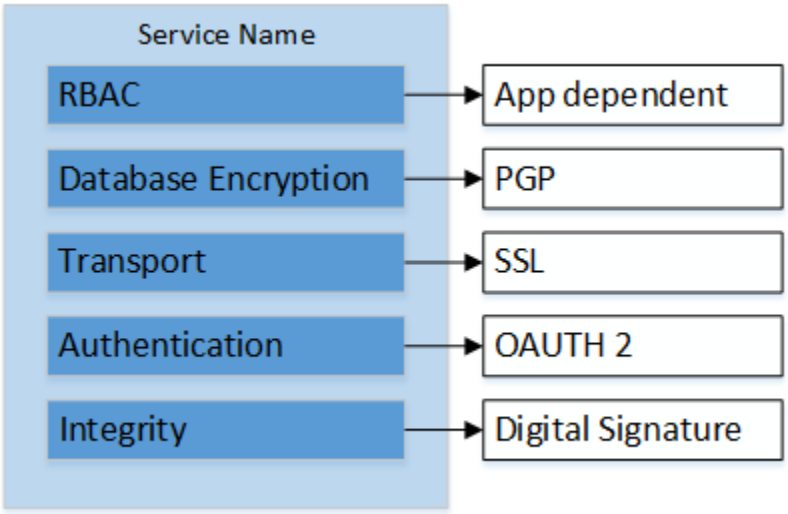
# 4. SECURITY ARCHITECTURE

The security architecture describes the components and mechanisms that address potential risks and threats to the IT system. Specifically, this architecture outlines the security components for two solutions: Option 1 is a custom build and Option 2 is a SalesForce solution. These two Options are further analyzed in sections 5 and 6, Deployment/Infrastructure and Technology, respectively. A recommendation for which Option is recommended will be outlined in the Execution plan document.

## 4.1 General Security Stack

The first diagram outlines a full security stack with examples of what is used to execute the specific security service. For example, database encryption can be done with PGP, while transport security may be done with SSL.

*Figure 12: General Security Stack*




## 4.2 Security Stack for Option 1: Custom Build

The diagram in this part outlines the security features available for each of the deployment services for Option 1, the custom build. For more details about each Option's deployments, relationships, and costs, see the infrastructure and deployment architecture, section 5, and the technology stack, section 6. For each of the services, such as AWS mobile hub, AWS Key management services, the full security stack is illustrated. A green check mark indicates that this service includes a certain security feature, while a red question mark indicates that it is unknown if that security feature exists.

Here is a summary of a description of each component:

Option 1: Custom Build

- Amazon SES: RBAC, Transport, Authentication
- Amazon SWS: RBAC, Transport, Authentication
- Amazon KMS: RBAC, Transport, Authentication, Integrity
- Amazon CloudFront: RBAC, Transport, Authentication
- Amazon RDS: RBAC, Database encryption, Transport, Authentication
- AWS S3: RBAC, Database encryption, Transport, Authentication, Intergity
- AWS Mobile Hub: RBAC, Transport, Authentication
- AWS certificate manager: RBAC, Transport, Authentication
- Third-party forms: Transport, Authentication
- AWS IAM: RBAC, Transport, Authentication

*Figure 13: Security Stack for Option 1*

## 4.3 Security Stack for Option 2: SalesForce

The diagram below outlines the security feature for Option 2, SalesForce.

Here is a summary of a description of each component:

- SalesForce: RBAC, Database encryption, Transport, Authentication, Integrity
- Amazon S3: Authentication: RBAC, Database encryption, Transport, Authentication
- Third-party payment system: RBAC, Database encryption, Transport, Authentication, Integrity

*Figure 14: Security Stack for Option 2*


## 4.4 Comparison of Option 1 and Option 2

A quick comparison of the two options seems to suggest Option 2 offers more integrated security support. However, it could be that Option 1 has more components, and therefore it is harder to point out how each component is implementing specific security measures. We will leave the detailed comparison of the two options to later sections, especially in the Technology Stack section.

## 4.5 Role-Based Access Control

Role-based access control is a key part in the security of modern IT systems. The following two matrices are provided to further describe the security architecture of the F2E IT System.

The CRUD matrix shows the relationship between the data model and the key processes identified in the software architecture. Each process denotes how much control a certain entity has over a certain process. CRUD refers to create, read, update and delete. For example, a student entity has read and update access over the Registration, Login, and Reset Password flow, while an F2E staff (IT) has create, read, update, and delete rights over Registration, Login, and Reset Password flow. The purpose of the CRUD matrix is to identify the security needs for each process flow.

The second matrix, access matrix, is an illustration of role-based access control in the F2E IT system. Rows represent different components of the IT System, while columns represent role entities. For example, F2E staff have access to the F2E database, while student do not.

*Table 4: The CRUD Matrix: Mapping the data model to the process model*

| Entities / Process | Student | Mentor | Donor | F2E Staff (Program) | F2E Staff (IT) | Application | Donation | Sponsorship Case | Deliverables |
|---|---|---|---|---|---|---|---|---|---|
| **Registration, Login, and Reset Password** | R, U | R, U | R, U | R, U | C, R, U, D | Not applicable | Not applicable | Not applicable | Not applicable |
| **Manage Donation** | R | R | R | R | R | R, U | R, U | C, R, U, D | C, R, U, D |
| **Review Application** | Not applicable | Not applicable | Not applicable | C, R, U, D | C, R, U, D | R, U | Not applicable | Not applicable | Not applicable |
| **Manage Sponsorship Case** | | | | C, R, U, D | C, R, U, D | Not applicable | Not applicable | R, U | Not applicable |
| **Submit Document** | C, R, U | | | C, R, U, D | C, R, U, D | Not applicable | Not applicable | R, U | R, U |
| **Manage F2E Database** | | | | R, U | C, R, U, D | Not applicable | Not applicable | Not applicable | Not applicable |
| **Manage F2E website/mobile app software** | | | | R, U | C, R, U, D | Not applicable | Not applicable | Not applicable | Not applicable |

*Table 5: The Access Matrix: Role-Based Access Control*

| Role / Content | Anony-mous | Prospective Student | Student | Mentor | Donor | F2E Staff (Program) | F2E Staff (IT) |
|---|---|---|---|---|---|---|---|
| **F2E database** | | | | | | ✓ | ✓ |
| **F2E Website and Mobile App Source Code** | | | | | | | ✓ |
| **F2E General Information** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **User Account Information** | | ✓(limited to oneself) | ✓(limited to oneself) | ✓(limited to oneself) | ✓(limited to oneself) | ✓ | ✓ |
| **Pre-verification Form** | ✓(limited to oneself) | ✓(limited to oneself) | | | | ✓ | ✓ |
| **Formal Application** | | ✓(limited to oneself) | | | | ✓ | ✓ |
| **Student Academic Report** | | | ✓(limited to oneself) | ✓ | ✓ | ✓ | ✓ |
| **Student Financial Expense Report** | | | ✓(limited to oneself) | | | ✓ | ✓ |
| **Donation Records** | | | | | ✓(limited to oneself) | ✓ | ✓ |
| **Donation Allocation Records** | | | | | | ✓ | ✓ |

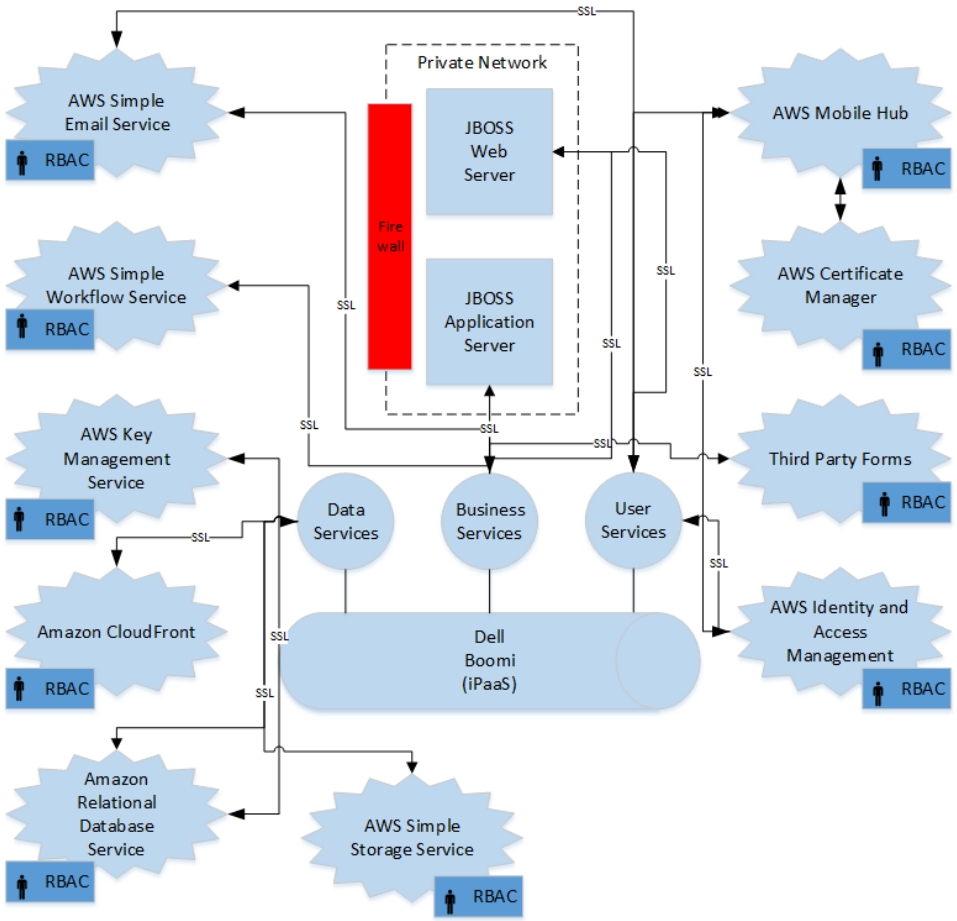
# 5. INFRASTRUCTURE/DEPLOYMENT ARCHITECTURE

An effective IT system needs the support of a solid infrastructure and deployment system, thus the purpose of the infrastructure and deployment architecture. This section illustrates the deployment diagrams for two Options, a custom build (Option 1) and a SalesForce solution (Option 2). Our final recommendation will come in the execution plan document.

## 5.1 Infrastructure and Deployment for Option 1: Custom Build

Our Option 1 is a cloud-based custom build infrastructure and deployment architecture. It strives to utilities cloud-based services to the maximum extent, while at the same time, keeping some custom build components to maintain flexibility. The diagram below is a layered view of the infrastructure and deployment architecture for Option 1.

*Figure 15: Layered View of Custom Build Deployment (Option 1)*



The following table provides a detailed description of the above diagram for Option 1.

*Table 6: Description of Deployment Diagram (Option 1)*

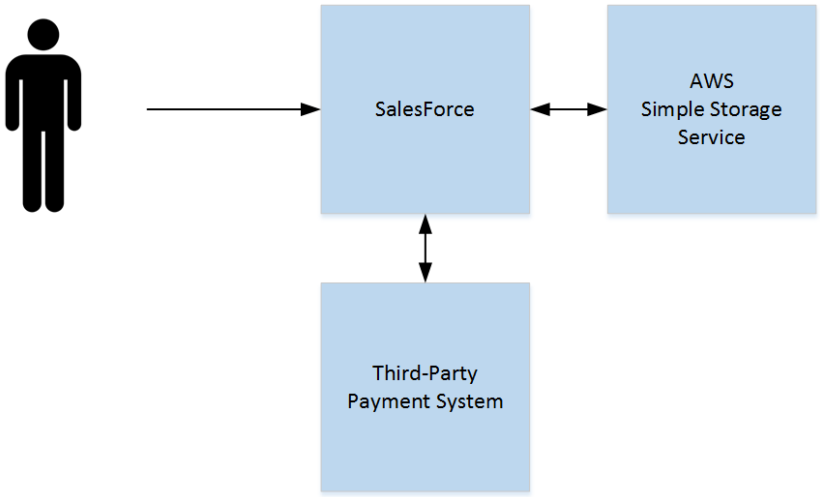
| Layer | Component | Service |
|---|---|---|
| **Data** | Database | Amazon Relational Database Service (RDS) |
| | Role-based access control | AWS Identity and Access Management (IAM) |
| | Database Encryption | AWS Key management service (KMS) |
| | File Storage | Amazon Simple Storage Service |
| | File Encryption | AWS Key management service (KMS) |
| | Data Services | Dell Boomi (iPaaS) |
| **Applicatio n** | Work Flow | Amazon Simple Workflow Service |
| | Forms | Third party service 123ContactForm |
| | Business Rules | Custom build into application using workflow. |
| | Application Logic | Red Hat JBoss Enterprise Application Platform |
| | Content | Amazon CloudFront |
| | Roles/Users | AWS Identity and Access Management (IAM) |
| | Communication | Amazon Simple Email Service, Amazon Chime<br>Amazon Simple Email Serice will be used for both personalized and mass emails.<br>Amazon Chime will be used to provide a virtual meeting platform for mentors and students as well as for virtual F2E staff meetings. |
| | Business Services | Dell Boomi (iPaaS) |
| **Access** | HTTPS | AWS Certificate manager |
| | File upload Security | AWS Identity and Access Management (IAM) |
| | Firewall | Application Firewall |
| | Role-based access control | AWS Identity and Access Management (IAM) |
| | User Services | Dell boomi (iPaaS) |
| **UI Layer** | Mobile application | AWS Mobile hub |
| | Web application | AWS Mobile hub |
| | Load balancer | AWS Elastic Load Balancing |

## 5.2 Infrastructure and Deployment for Option 2: SalesForce

This second part depicts a deployment diagram for recommendation Option 2, SalesForce, to show the components of the proposed solution.

Option 2 includes extra storage from AWS Simple Storage Service, due to the lower cost. The cost to add additional storage with SalesForce greatly exceeds the cost of S3.

*Figure 16: Components of SalesForce Deployment (Option 2)*




Since Option 2's componets are very self-explainary, we do not include a description table here.

## 5.3 Comparison of Option 1 and Option 2

Both of these Options are cloud-based, but Option 1 has more moving parts while Option 2 is more consolidated. Therefore, Option 2 seems to be easier to set-up and maintain. A detailed comparison of two Options will be provided in the following section.

# 6. TECNOLOGY STACK

We compared a wide-range of technology components that could potentially meet the needs of F2E's solution. Ultimately, we narrowed it down to two Options. Option number one is leveraging Amazon Web Services (AWS) for almost all the functionalities needed. This approach ensured that F2E had a full cloud-based solution that was very reliable and customizable. Option number two is leveraging Salesforce's powerful yet easy-to-customize and easy-to-setup cloud customer relationship management (CRM) platform. Both Options use an Amazon virtual machine to host a website that uses WordPress for content management.

## 6.1 Cost Breakdown of Option 1

In this part, we attempt to break down the cost of our two Options in order to make a comparison. We first look at Option 1 – Amazon Web Services. The figure below describes main components of Option 1, while the table below breaks down the cost of Option 1.

*Figure 17: Layered Diagram of Option 1*

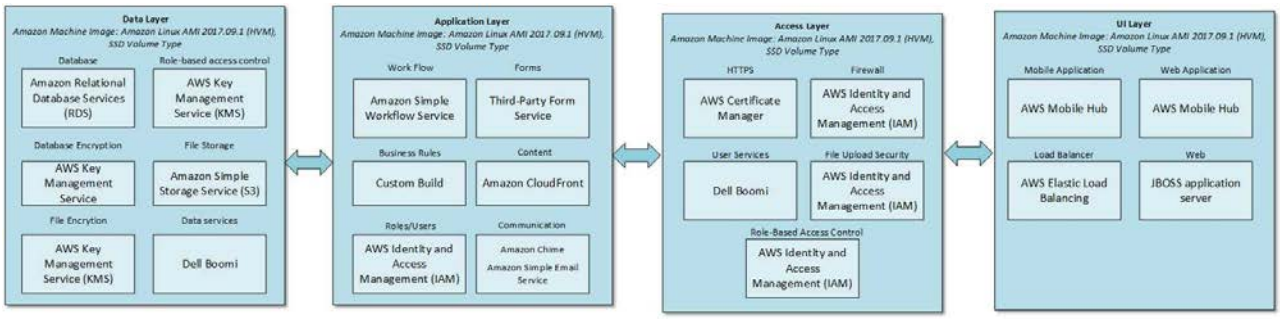


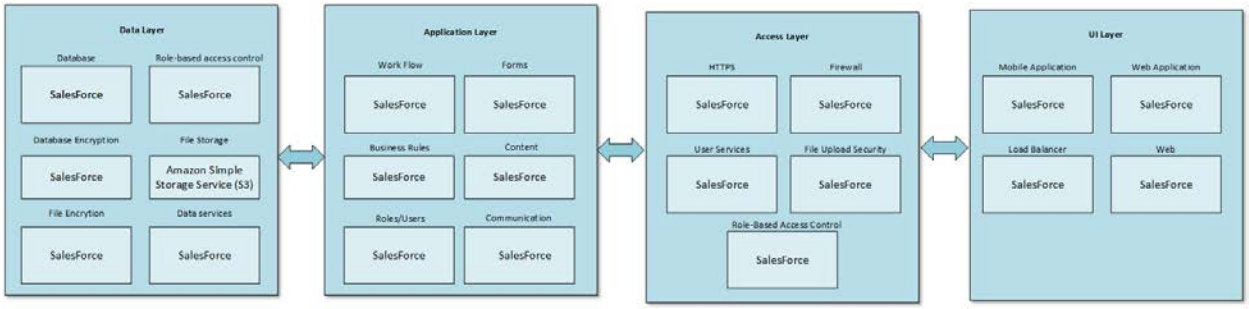
*Table 7: Cost Breakdown of Option 1*

| Technology | Description | Cost |
|---|---|---|
| **Amazon Relational Database Services (RDS)** | Number of DB instance: ,<br>DB Engine: MySQL ,<br>Class and deployment: db.m1.small<br>Storage: 5 GB | Monthly: $40.84 |
| **AWS Key Management Services (KMS)** | Free Tier<br>20,000 requests/month | No Additional Cost |
| **Amazon Simple Storage(S3)** | Standard Storage<br>Estimated 900 GB /monthly | Monthly: $20.70 |
| **Dell Boomi** | Professional Edition | Monthly: $2000 |
| **Amazon Simple Workflow Service** | Free Tier includes (monthly):<br>1,000 executions<br>1,000 tasks, timers, signals and markers, and 30,000 workflow-days | No Additional Cost |
| **Third-Party Form Service** | 123 Form Builder<br>Gold Plan which includes:<br>20 Forms<br>Unlimited fields per form<br>5000 submissions per month<br>Unlimited API Calls<br>Mobile Platform support | Monthly: $24.99 |
| **Amazon CloudFront** | Data Transfer Out Monthly Volume:<br>25 GB/Month | Monthly: $6.25 |
| **Amazon Chime** | Free Tier includes:<br>Video calls for up to 2 people<br>Chat & chat rooms | No Additional Cost |
| **Amazon Simple Email Service** | Price based on following estimates:<br>Email Messages per day 3,000<br>Attachments: 10 GB/Month | Monthly: $4.25 |
| **Amazon Simple Notification Service** | Free Tier includes (monthly):<br>1,000,000 Amazon SNS Requests, 100,000 HTTP notifications,<br>1,000 email notifications and 100 SMS | No Additional Cost |
| **AWS Certificate Manager** | You pay only for the AWS resource you create to run your application. | No Additional Cost |
| **AWS Identity and Access Management (IAM)** | IAM is a feature of the AWS account with no additional charge. | No Additional Cost |
| **AWS Mobile Hub** | You pay only for the underlying AWS services you use. There is not additional charges for using the AWS Mobile Hub. | No Additional Cost |
| **2 Linux Virtual Machines (for JBOSS Webs Server and JBOSS application server)** | Type: Linux on t1.micro<br>MySQL and PHP will be installed on these machine | Monthly: $29.28 |
| **WordPress** | Front-end content editor | No Additional Cost |

## 6.2 Cost Breakdown of Option 2

In this part,  we again provide a layered view of our Option 2 components as well as its cost breakdown.

*Figure 18: Layered Diagram of Option 2*




Now we break down the cost of Option 2 – Salesforce in the table below.

*Table 8: Cost Breakdown of Option 2*

| Technology | Description | Cost |
|---|---|---|
| **Salesforce** | 10 first users are free.<br>$36/user/month<br>Assuming 10 F2E staff users and 200 student users, 200 licenses will be needed. As more students participate then more licenses could be added. Also, when the mentor program is started additional licenses can be added as well. | Monthly:  $7,200 |
| **Salesforce with G-Suite** | Email service and other G-suite products | No Additional Cost |
| **Salesforce Website** | Website will be built using Force.com Sites<br>As long as the website has | No Additional Cost |
| **Storage - Salesforce + Amazon S3** | Included in the Enterprise Salesforce.com Edition is 20MB of data storage and 100 MB of file storage. The file Storage per organization is 1GB.<br><br>Because F2E is estimated to need more than 1GB of organizational storage we also included additional storage.<br>Amazon S3<br>Standard Storage<br>Estimated 900 GB /monthly | Amazon S3<br>Monthly: $20.70 |
| **Salesforce Third-Party App: Cloudpond S3 Connector for Amazon S3 Storage** | Connects Salesforce to an S3 Account. | Monthly: $64.99 per company |

## 6.3 Comparison Based on Specific Criteria

In this part, we use specific criteria to compare Option 1 and 2. The criteria we used include cost, talent required, security, maintainability, scalability, support from vendor, as well as customizability.

*Table 9: Comparison Based on Specified Criteria*

| Criteria | Option 1 – Custom Build | Option 2 – Salesforce | Best Choice based criteria specified |
|---|---|---|---|
| **Cost** | Monthly expenses: $2126.31 | Monthly expenses: $7285.69 | Option 1 seems less expensive, but when you add up the labor costs to setup and maintain Option 1 is more economical. |
| **Engineering talent required for initial setup and updates** | Engineer would need to be familiar with AWS and how to customize and integrate a wide range of services. | Engineer would need to be familiar with Salesforce and how to customize. Because fewer distinct services are used, there would be less need to integrate. | Option 2 would be a more straightforward process and would require less distinct components to setup. |
| **Security** | Each distinct component of AWS would provide its own security features. Potential security weaknesses include configuration of security within each component and in relation to other components. All security features would need to be cohesive. | Salesforce would provide its own security features. Potential weaknesses include proper configuration and integration into the front-end. | Option 2 is a better choice because the attack surface is narrower, and, therefore, it is more secure. It also has less components, so therefore fewer customized security. |
| **Maintainability** | Even though AWS would take care of updates and patches, the overall system would need to be maintained to ensure that any changes in one service doesn't negatively impact other dependent services. | Salesforce would take care of updates. Because many of the architectural components are housed within Salesforce there isn't many dependencies. | Option 2 is easier to maintain because it has less components and, and, therefore, it has fewer dependencies. |
| **Scalability** | Each component from AWS is scalable. | Salesforce is scalable. | Same |

| | | | |
|---|---|---|---|
| **Support from vendor** | Amazon provides support for discrete services but not for the overall solution. | Salesforce provides support for its services. | Option 2 is better supported because it is a packaged solution. |
| **Customizability** | Each component of AWS that is part of the solution is fully customizable. | Salesforce is customizable. | Option 1 is more customizable because you have more granular control of each separate service. |

# 7. CONCLUSION

This milestone outlined two possible solutions: a custom build and SalesForce. Thus far, option 1 has the advantage of being fully customizable and extremely scalable. In contrast, option 2 has the advantage of being cohesive, well-integrated, customizable and scalable. That is, there are fewer customization and implementation considerations for option 2, making it a possibly more convenient option.

The final recommendation between the two options will be provided at the end of the execution plan document once we have taken into consideration execution and ongoing costs and timeline of implementation.

# 8. GLOSSARY

*Table 10: Glossary*

| Term | Description |
|---|---|
| **NFR** | Non-Functional Requirement(s) |
| **SES** | Amazon Simple Email Service |
| **SWS** | Simple Workflow Service |
| **KMS** | Key Management Service |
| **RDS** | Relational Database Service |
| **S3** | Amazon Simple Storage Service |
| **IAM** | Amazon Identity and Access Management |

# 9. REFERENCES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- https://developer.atlassian.com/confdev/development-resources/confluence-architecture/confluence-internals/confluence-ui-architecture
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