

Finance to Education

Architecture Design Document Part 2

Software, User Experience/Interface, Security, and Infrastructure Architecture & Technology Stack



Trust the Process
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1 INTRODUCTION

We will now explain the remaining five information architecture sections. The following sections follow: software architecture, user experience and user interface architecture, security architecture, infrastructure architecture, and the technology stack. Software architecture will show that the components of a potential software solution for F2E is viable with respect to a layered approach. User interface and experience architecture will show how the phone and desktop screens will be presented to the user. It will give a prototype for future developers to implement. Security architecture will explain how the system will mitigate threats as well as deal with attacks. The infrastructure architecture will outline the physical components for the solution. The technology stack will provide an explanation of the technologies to be used with a justification of why it is the best for F2E.

2 SOFTWARE ARCHITECTURE

Introduction

Finance to Education solution is entirely software based and as such requires us to document the structure of the software. One approach we will use is a layered approach to classify the components of the software. The 4 layers that will be looked at is the following: Presentation, Business, Persistence (Data), and Data Sources (Databases).

Presentation Layer: (End user level, UI/UX component)

Business Layer: (Business Processes, business rules, non-functional requirements)

Persistence Layer (Data): (Rules related to data access and management)

Data Sources (Databases): (The unique databases for storing the data)

Layered Approach

The layered approach will classify the components for the five main subsystems from the component model in the conceptual architecture document.

1. Student Selection
2. Allocate Student Funds
3. Student Tracking
4. Career & Education Guidance Service
5. Student Graduation

Student Selection

Presentation Layer:

- Student has to send a pre-verification form through the online portal
- Student and F2E coordinator have interaction through email or directly on the site
- Student sends a formal application once specified by F2E
- Student receives a notification for an offer

Business Layer:

- There has to be an easy way for F2E to manage the verification forms they receive
- F2E coordinators should be able to make a determination on a student easily based on the structure of the forms

Persistence Layer (Data):

- F2E coordinators have access to the student information

Data Sources (Databases):

- Database that contains all the pre-verification forms with a user/student identification number
- Database that contains information regarding the student based on ID
- Database that contains all the formal applications for students
- Database that contains the interactions between students and coordinators

Allocation Subsystem**Presentation Layer:**

- Student receives an offer in the mail and on the online portal as a detailed document
- Student can see their current offer, terms, etc...

Business Layer:

- F2E sends information to students
- F2E can easily track the resources they have sent to the student

Persistence Layer (Data):

- F2E can manage their resources
- Students can access their funding details

Data Sources (Databases):

- Database that contains all information regarding a specific students funding terms
- Database that contains all the information on a specific student based on ID

Tracking Subsystem**Presentation Layer:**

- Student receives notification in the portal that their reports are due at the end of the system
- Students submit reports through online portal
- Student receives a notification when the F2E coordinator determines the student gets continued funding

Business Layer:

- F2E can receives reports from students and determines if they met the terms
- F2E sends reports to the donors
- F2E notifies a student if they met the terms

Persistence Layer (Data):

- F2E can access old information regarding the students
- Students have access to all old reports and sends the new reports to the coordinator

Data Sources (Databases):

- Database that contains all the reports for a given student
- Database that contains all the terms for a given student
- Database that contains all information regarding a specific student based on ID

Career & Education Guidance Service Subsystem**Presentation Layer:**

- Students enter the CEGS module in the online portal

- Mentors can request to find a student who needs help through their account

Business Layer:

- F2E can easily match a student with a mentor

Persistence Layer (Data):

- F2E coordinators can access the information regarding the students and mentors
- Mentors can find information on their students

Data Sources (Databases):

- Database that contains a list of mentors and donors
- Database that contains all the information regarding a specific student based on ID

Graduation Subsystem

Presentation Layer:

- Student receives notification in the portal that their final graduation reports are due
- Students submit reports through online portal
- Student receives a notification when the F2E coordinator determines that they graduated and ends the program

Business Layer:

- F2E receives graduation reports from students and determines if they graduated
- F2E sends reports to the donors
- F2E notifies a student if they met the terms and ends the lifecycle

Persistence Layer (Data):

- F2E can access old information regarding the students
- Students have access to all old reports and sends the new reports to the coordinator

Data Sources (Databases):

- Database that contains all the reports for a given student
- Database that contains all the terms for a given student
- Database that contains all information regarding a specific student based on ID

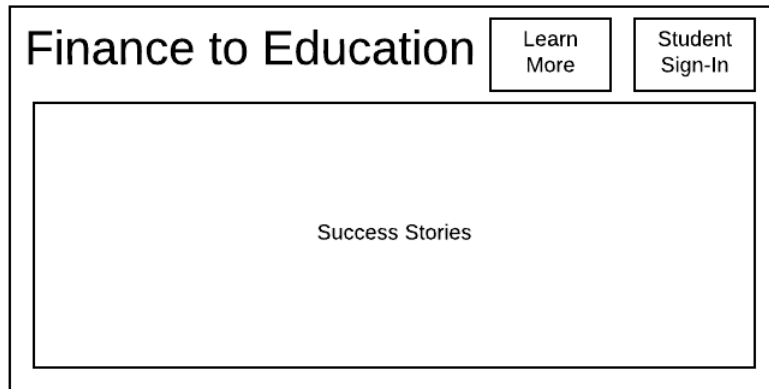
Recap

Overall, the layered approach shows the presentation, business, persistence, and data source layers at the five main subsystems of the solution. The software that will be constructed will need to keep in mind each layer for all the subsystems in order for it to perform the tasks at hand. By looking back on the Business Requirements Document, we determined the items in each layer based on the non-functional requirements.

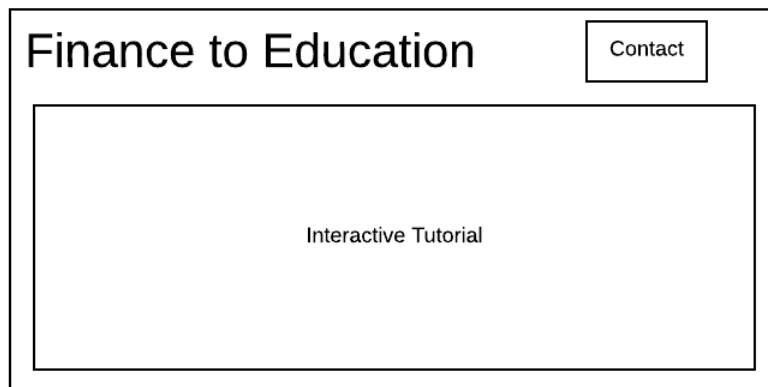
3 USER EXPERIENCE / INTERFACE ARCHITECTURES

Introduction

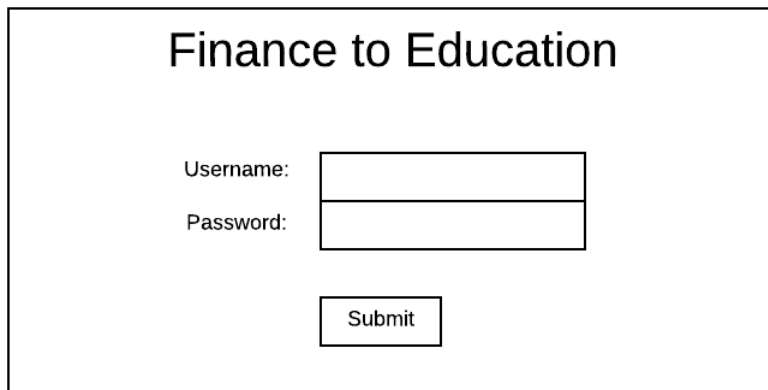
The user experience and interface architecture will show how the aesthetic appearance on a specific device. In this document, our focus is solely on a desktop/laptop screen. What follows is a series of hand-drawn screen flows along with descriptions regarding each screen. We are choosing to only show a desktop/laptop screen because it will be the most effective way to show all the features. The following diagrams are a high-level description of the screen contents and will serve as the basis for future UI depictions.

Main/Home Page:

The home page serves as a way for prospective students to find out information on F2E as well as a page for current students to sign in. The “Learn More” button will be geared towards prospective students who want to learn more about the program. The “Student Sign-In” button will allow current students to sign-in to the student portal.

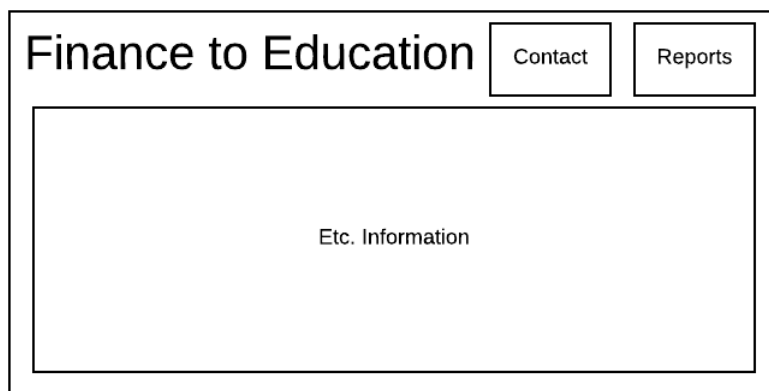
Learn More:

The learn more pages is geared specifically towards prospective students. On the upper right corner of the screen there is a button for the user to contact F2E. The interactive tutorial in the middle will be designed to educate the student on the program.

Student Sign-In:

The diagram shows a rectangular box representing a web form. At the top center is the title "Finance to Education". Below the title, on the left, are the labels "Username:" and "Password:". To the right of "Username:" is a single-line text input field. To the right of "Password:" is a single-line text input field. Below these two input fields is a rectangular button labeled "Submit".

The student sign in page is where a student logs in to their account. These students are already registered and receive funding. Once the submit button is clicked, the login credentials will be encrypted and sent to the login database for validation.

Student Portal:

The diagram shows a rectangular box representing a web page layout. At the top left is the title "Finance to Education". To the right of the title are two rectangular buttons labeled "Contact" and "Reports". Below the title and buttons is a large rectangular area. In the center of this large area is the text "Etc. Information".

The student portal page is where a student can manage their reports, interactions, and other things related to their funding.

Analysis:

This high-level overview of how a potential website would look shows the features that are important to F2E core business operations. F2E needs a user interface and user experience that is easy to use for current students and informative to prospective students. This high-level overview will help UI and UX designers in the future understand the key aspects of F2E.

4 SECURITY ARCHITECTURE

Introduction

Security architecture is one of the most important items when constructing F2E's solution. Currently they store and manage all of their information on site at a physical location. Moving the data to an online cloud service will raises some well-founded security questions. In order for us to create a solution that secures the data and is built to withstand attacks we will construct a

threat model specific to F2E. This threat model will determine what information is highly sensitive, where the weaknesses are, as well as other items.

Threat Model

Sensitive Data:

- Login information
- Bank statements, records, reports, transactions, anything related to linking a bank (Bank standards need to be followed and met)
- Emails, interactions between students, mentors, coordinators, donors
- Explicit student information on the administration side

Vulnerabilities:

- Improper handling of encryption and decryption of login credentials can be a big weak spot
- Bank statements and transfer of funds is another weak spot

Countermeasures:

- Legal standards that follow the transfer of money between accounts
- Securing the bank information
- Proper encryption/decryption

5 INFRASTRUCTURE ARCHITECTURE

Introduction

Infrastructure architecture will lay out a feasible plan for F2E to deploy their software solution. We will look at many components regarding a software solution. These include the following:

- Computer Hardware
- Storage Hardware
- Communication details (type of cable, network, speeds)

Computer Hardware:

This software solution will require a significant amounts of computer hardware to get the software working at the necessary speeds.

Storage Hardware:

The solution will require a lot of storage hardware to store and manage the massive amounts of data. The type of database management system to be used will be discussed in the technology stack section.

Communication Details:

This will be dependent on the technology components that will be used to create the solution. The network speeds are specified in the non-functional requirements. Pre-determined maintenance and accessibility is also specified in the non-functional requirements.

Recap

The computer and storage hardware discussed above will be implemented using the technologies specified in the technology stack. When determining the technology to use, we need to also take into account the non-functional requirements.

6 TECHNOLOGY STACK

In order for F2E to deploy their solution as outlined in the previous sections they need to select the right technology components. In this section, we will list out technologies that would allow a capable solution. Given the low cost and efficiency in hosting data in the cloud, we will use Amazon Web Services. AWS is the leading cloud service on the market. AWS has proven services such as compute, hardware, software, security, analytics, and many more. We will also use Adobe XD Creative Cloud for creating a UI/UX design. Once a UI/UX design is created we will hand over our prototype to a team of developers who will use the language and operating system that will get the job done.

7 RECAP

Software architecture, user experience/interface architecture, security architecture, infrastructure architecture, and the technology stack were explained above. Software architecture used the layered approach to explain each subsystem. User experience and user interface architecture laid out high-level desktop screens. Security architecture listed the security threats and vulnerabilities in the form of a threat model. Infrastructure architecture gave a brief overview of the underlying technology components needed for a successful solution. Finally, the technology stack listed the potential technology components to use when creating the solution.

8 GLOSSARY

Glossary Table

Term	Description
F2E	Finance to Education
Db	Database
UI	User Interface
UX	User Experience
ID	Identification
AWS	Amazon Web Service

9 REFERENCES

1. Singal, Rahul. *TrustTheProcess-Deliverable1*. PDF.
2. Singal, Rahul. *TrustTheProcess-Deliverable2*. PDF.