

INF1342: SkillNET Application Requirements and Architectural Design

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1 THE PURPOSE OF THE PROJECT

1.1 THE USER BUSINESS OR BACKGROUND OF THE PROJECT EFFORT

- **Aim:** to organize data pertaining to necessary skills in a given industry; some examples of skills necessary for specific industries would include:
 - Ability to interpret blueprints and lay out reference points for installation for electricians.
 - Motor and wiring competency and safety code education for industrial technicians.
 - SAS (Statistical Analysis System) programming competency for capital market analysts.
 - R or Python programming competency to conduct research for public policy analysts.
- **Business conducted:** Connecting academic programs offered by educational institutions to skills desired in related industries.
- **Context:** Education, Skills, and Training
- **Opportunity trigger:** Lack of clarity between learning outcomes of professional programs to desired industries skills for students hoping to enter the associated industry.
- **User intention with product:**
 - Students browse academic institutions and its associated programs based on industry
 - Educational institutions attract more students by providing clarity on skills taught by programs for a given industry
 - Commercial enterprises and their respective Industry associations gain access to a larger reserve of skilled labour.

Motivation

- SkillNET seeks to provide up to date information regarding the desired skills in a given industry and connect it to available academic programs offered by educational institutions to create and adjust courses in existing curriculums.

Considerations

- Necessity of business solution:
 - As economies shift to accommodate the 3rd industrial revolution, not only will people's work adjust, but so will the manner in which we are educated and trained. SkillNET hopes to be ahead of the curve in this regard and allow educational institutions to work directly with industries to provide this service; the application matches skills to programs and curriculums to create a robust database through the users/stakeholders themselves.

1.2 GOALS OF THE PROJECT

Goal 1:

Purpose: To provide functionality which connects the appropriate stakeholders to their desired goals pertaining to skills education.

Advantage: SkillNET will earn the trust of stakeholders, drawing more users to the platform.

Measurement: At any time, SkillNET will know the difference between student, educational institution, and industry association accounts and their respective permissions and access in the application.

Goal 2:

Purpose: Provide a search function that returns salient data relevant to the user.

Advantage: Accurate queries ensure data is reliable for stakeholders to connect them to the appropriate student/industry/learning platform.

Measurement: Queries must be interpreted by the search engine to understand the intent of the user and return the most relevant results with an accuracy of at least 99%.

Goal 3:

Purpose: To provide a platform that is compatible in multiple languages.

Advantage: Being available to as many people as possible to accommodate more users and further populate our app, in terms of industry representatives and potential students.

Measurement: SkillNET must be available and be at least 99% comprehensible by users who speak English, Mandarin, Hindi, Spanish, and French.

2 THE STAKEHOLDERS

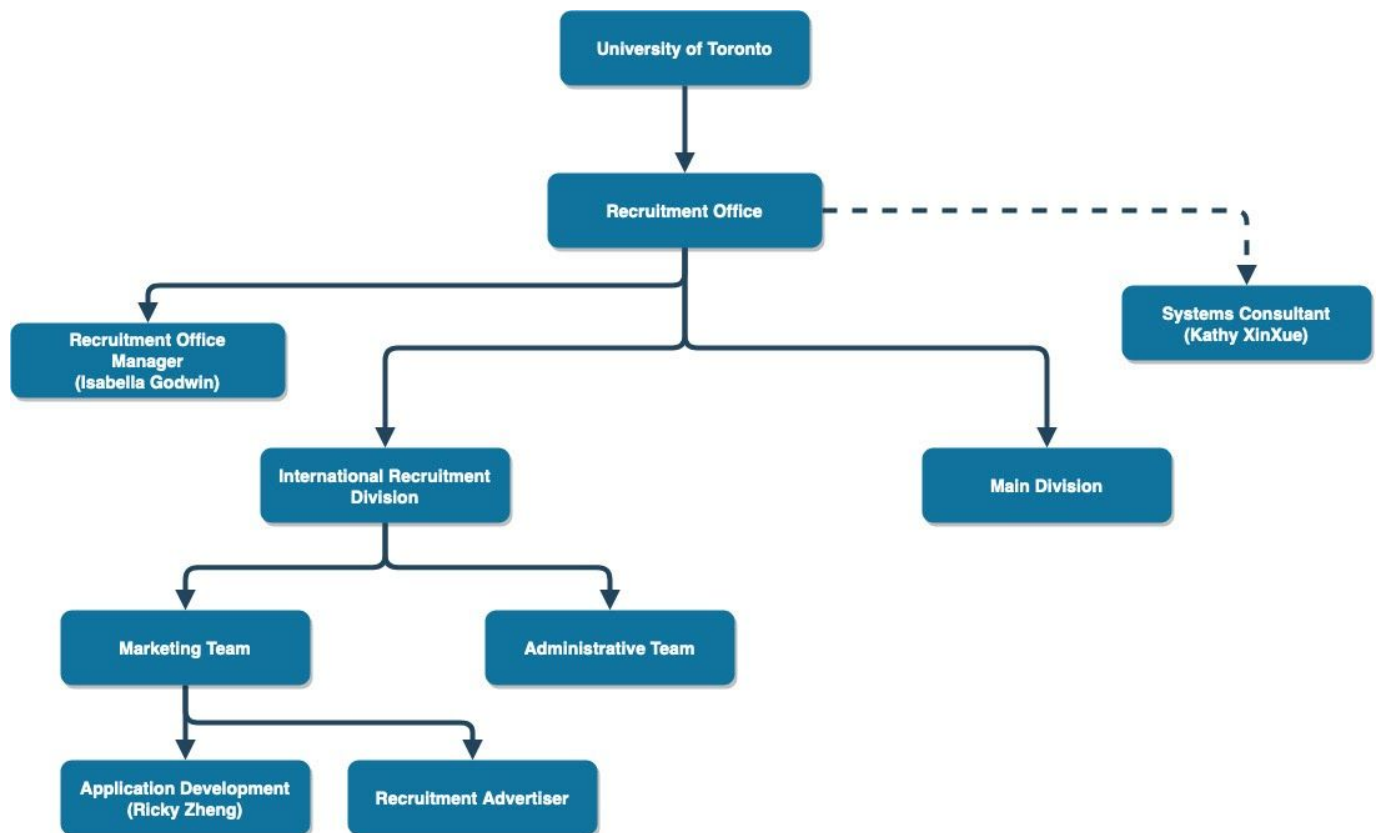
2.1 THE CLIENT(S)

- Kathy Xinxue (Systems Consultant) & Ricky Zheng (Application Development)

Motivation: The clients are investing in an application that can meet the needs of international students. They are investing in solutions to the issues that they had when personally applying for universities abroad. The clients are aware of the need for this application in the market and wish to profit off of a solution.

Considerations: Ricky Zheng is the head of Application Development within the International Recruitment Division for the University of Toronto's Recruitment Office. Kathy Xinxue is an external systems consultant assigned to the Marketing Team by the University of Toronto until this project has been completed.

Client Organization:



Client Responsibilities:

- Provides a list of core requirements for the system.
- Submit suggested project cost to the Recruitment Office Manager based on architectural design.
- Approves the extent and extensibility of the project scope based on architectural design.

2.2 THE CUSTOMER

- Isabella Godwin (Recruitment Office Manager)

Motivation:

- Responsible for developing, coordinating, and delivering outreach programs and marketing strategies, including arranging workshops and webinars for prospective students.
- Looking to engage with SkillNET to market her university to industries interested in creating appealing programs for students.

Customer Responsibilities:

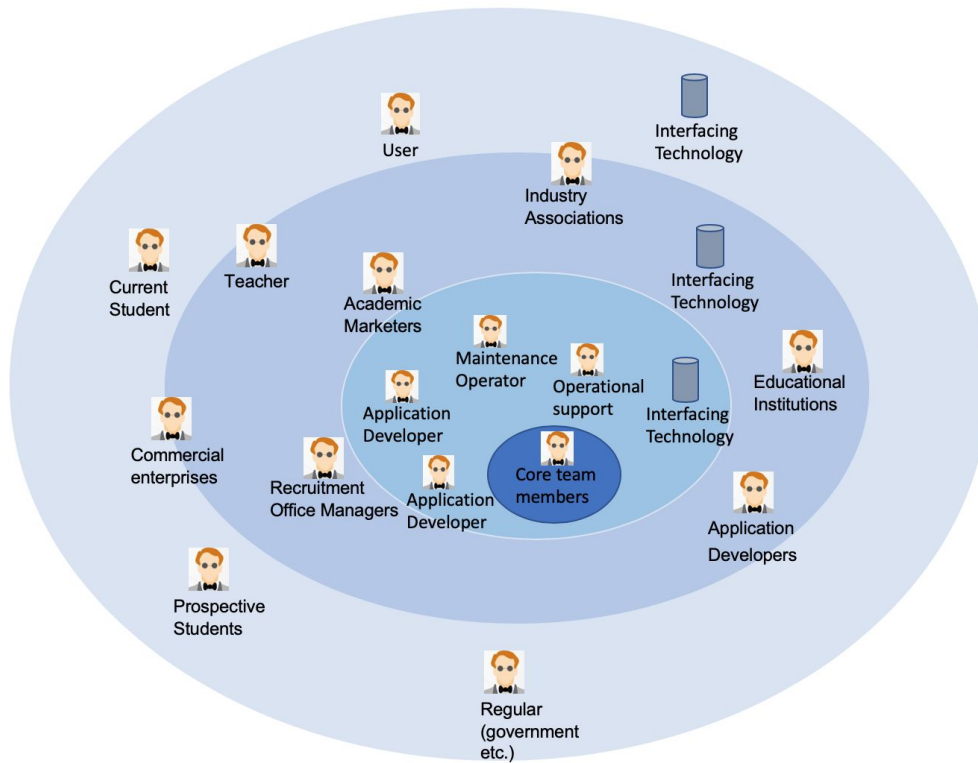
- Organizes and implements all aspects of large, multi-departmental special events utilizing presentation and promotional materials, maintaining budgetary and operational controls, coordination skills with multiple entities and representing her educational institution.

2.3 OTHER STAKEHOLDERS

1. SkillNET development team
2. Students
3. Academic Marketer (Ricky Zheng)
4. Recruitment Officers (Isabella Godwin)
5. Industry Associations
6. Educational Institutions (Universities, Colleges, electronic learning platforms)
7. System Consultant (Kathy XinXue)

Motivation:

- SkillNET developers can assess the proposed effectiveness and profitability of the application.
- Students can browse alternative paths for skills training and situate the required education with the industry domain to prepare them for what is necessary for their desired career path.
- Educational Institutions increase program awareness and enrollment, by helping to develop enhanced marketing tools.
- Industry associations have a larger pool of skilled workers that they may employ to their organization.
- Recruitment officers can create, package, monitor, and distribute information materials, forms, webinars, and other resources for student recruitment and retention.
- System consultants can analyze trends in recruitment and retention to develop strategies for program evaluation or collaboration with industries and commercial enterprises.



#	Stakeholder Identification	Knowledge needed by the project	Degree of involvement	Degree of influence	Agreement on how to resolve conflicts with stakeholders with similar interests
1	Current Students	Low	Low	High	Students are the primary stakeholder in terms of usage; all parties will yield to student needs.
2	Prospective Students	None	None	High	Students are the primary stakeholder in terms of usage; all parties will yield to student needs.
3	Academic Marketer	High	Low	High	Decisions must be negotiated in consultation to ensure that the best solutions are met for Students,.
4	Recruitment Office Manager	Medium	Low	High	Decisions will be negotiated with Group 12 Solutions through Ricky Zheng's recommendations.
5	Industry Associations	None	None	Low	Industry Association's needs will yield to Current and Prospective Students.
6	Educational Institution	Low	Low	Low	The interests of Educational Institutions are entirely different from other stakeholders. Needs not being met will be negotiated between academic marketer and Group 12 Solutions on an adhoc basis.
7	System Consultant	High	Low	High	Their recommendations will be negotiated with Zheng and the SkillNET team together.

3 CONSTRAINTS

3.1 SOLUTION CONSTRAINTS

Description: The solution must operate with real time information.

Rationale: The solution cannot operate with out of date information.

Fit Criterion: The information in the system responds to real time updates.

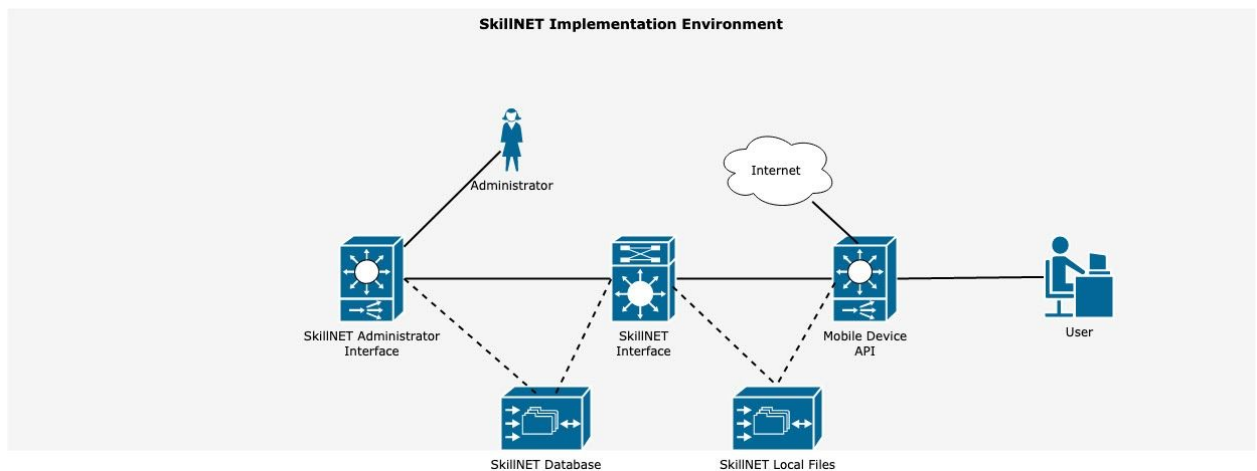
Description: The application must be able to interact with the existing databases of the Educational Institutions (EI) and Industry Associations (IA) stakeholders.

Rationale: The interfaces to the stakeholder's systems are constraints, as no data can be exchanged without a compatible and interactive web-based interface.

Fit Criterion: Program information is uploaded by the stakeholders.

3.2 IMPLEMENTATION ENVIRONMENT OF THE CURRENT SYSTEM

There is no current system in place. The architectural design represents a solution that requires development past the basic Mobile Application design. However, the proposed system will be created as a Mobile Application, so the environment will be a mobile device and include the following interfaces:



The components are described as follows:

- SkillNET Administrator Interface - the interface used by Administrators to manage data.
- SkillNET Interface - the interface that users engage with to update, query, or delete information from the SkillNET Database.
- Mobile Device API - the interface contained within the respective mobile device.
- SkillNET Database - the online database containing institutional information.
- SkillNET Local Files - the local SkillNET files stored on the mobile device.
- User - the System user.
- Administrator - the System administrator.

Motivation: The generic interface provides a simple foundation for the application to be developed in a simple, predictable, and user friendly fashion.

3.3 PARTNER OR COLLABORATIVE APPLICATIONS

There are no partner applications because SkillNET wants to develop a new solution to problems that other applications do not currently address in a meaningful way.

3.4 OFF-THE-SHELF SOFTWARE

Microsoft Azure, which is a platform for web application design that includes a SQL database system. Microsoft Azure would allow our system to fulfill its data requirements and include a pay by the minute of usage feature, benefitting scalability and reducing operational costs in the early stages of development and launch.

Motivation: This solution would allow SkillNet to operate within a Microsoft framework which is proven to be reliable for security. Additionally, the Microsoft Azure framework is the reference architecture that we have selected for this product, so it would be seamless to integrate this off the counter product.

Considerations: One critical issue is that this solution will rely on Microsoft for security and maintenance. A hybrid solution which is entirely managed by SkillNET would better meet our user's needs since Group 12 Solutions would be able to fully manage the solution.

3.5 ANTICIPATED WORKPLACE ENVIRONMENT

Group 12 Solutions is a small group of 5 people with differing skills and minor differences in opinion about the project vision. Any solution needs to be flexible to meet these differences as they arise and, hopefully, integrate them into the final product. Additionally, such a small team requires a solution that can be designed easily because the maximum amount of time spent working on a solution is limited by the number of people.

Ultimately, if the solution is not viable for the workplace environment, Group 12 Solutions is committed to redesigning the workplace as needed to ensure that the solution meets the needs of all stakeholders.

3.6 BUDGET CONSTRAINTS

Funding Constraints based on Recruitment Office Manager's decisions and recommendations that are pending this Architecture and the following approval.

3.7 SCHEDULE CONSTRAINTS

The current timeline for deliverables, provided by the Recruitment Office Manager, is as follows:

- 3 month checkpoint: product architectural design
- 3 months following response: develop application prototype
- 6 months following prototype feedback: full global launch

Total estimated time: 14 months.

4 NAMING CONVENTIONS AND TERMINOLOGY

4.1 GLOSSARY OF ALL TERMS, INCLUDING ACRONYMS, USED BY STAKEHOLDERS INVOLVED IN THE PROJECT

- **ASR** - Architecturally Significant Requirement. The requirements that SkillNET has deemed significant in the process of selecting the reference architecture.
- **PUC** - Product Use Case, specified by title. Example: "Student Career Search." Not to be mistaken for a Business Use Case.
- **Open House/Info Days (OHID)** - Events scheduled by educational institutions to advertise their programs to prospective students.
- **Course List** - The list of courses offered by a specific program.
- **Payment Company (PC)** - The external company that handles payment requests.
- **Payment Authentication System** - The system that authenticates user payments for premium account services such as advanced search features, additional information access, and additional data upload types.
- **Indent Course** - Requesting that a course be added to the Course List that provides a specific Skill.
- **Course Request Form** - The documentation required to indent a course.
- **Course Request** - The action of submitting a Course Request Form.
- **Skill** - A marketable ability proven through experience or certification that employers require or find useful for a given area of work. Ie. Python, SQL, Excel, Microsoft Word.
- **Student Career Data** - All data about a program, the skills that the program provides, the degree or certificate that corresponds with the program, and any potential industry value associated with the degree or certificate.
- **Educational Institution (EI)** - Any institution that offers courses in order to complete individual skills training, auxiliary training, certification, or a degree through in person or distance learning.
- **Current/Prospective Students (CPS)** - The combination of current students and prospective future students into a single entity.
- **Current Students** - Students currently enrolled in an EI.
- **Prospective Students** - Students currently deciding if they wish to enroll in an EI.
- **Commercial Enterprise** - All services involving financial and industrial aspects that hires individuals for employment.

5 RELEVANT FACTS AND ASSUMPTIONS

5.1 RELEVANT FACTS

- Prospective students will be interested in this application.
- Stakeholders need to be involved with the application i.e students are interested obtaining information for a career, EI and/or IA will up endorse their curriculums/programs using an online platform.
- The application will involve a relational database.

5.2 BUSINESS RULES

- **FIPPA Requirements:** As a component of the University of Toronto, SkillNET development adheres to the Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c. F.31, s. 1, and is required to keep all records that contain personal information for 2 years before disposition.
- As this is primarily a mobile phone application, it needs to adhere to the following material design guidelines for visual and navigation patterns, operating system compatibility, performance, and security:
 - The iOS Human Interface guidelines to meet iPhone Requirements:
<https://developer.apple.com/design/human-interface-guidelines/ios/overview/themes/>
 - The Android Design Guidelines:
<https://developer.android.com/design>.

5.3 ASSUMPTIONS

- The product will be able to interface with other APIs, such as LinkedIn, Facebook, Stats Canada, Mcleans, etc. without any issues.
- SkillNET will meet the needs of prospective students despite their lack of involvement.
- SkillNET will be expandable to other institutions without redesigning the project scope.

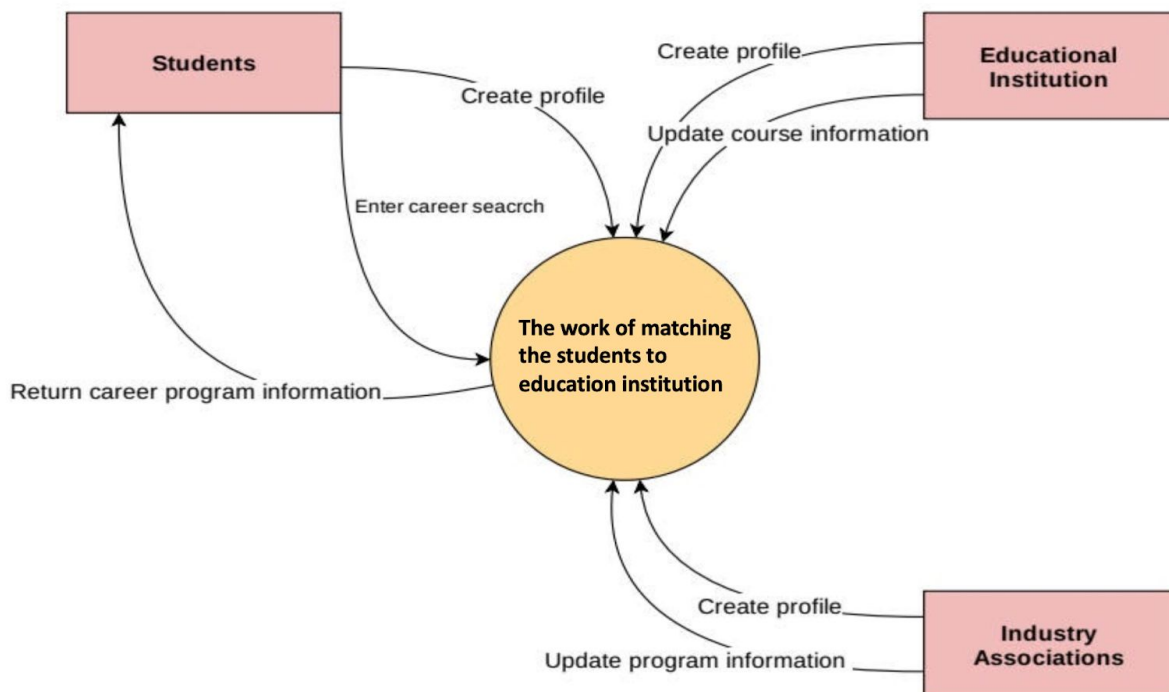
6 THE SCOPE OF THE WORK

6.1 THE CURRENT SITUATION

Group 12 Solutions is a 5 personal work force that consists of two programmers, two marketers, and one business/systems analyst. The current team process is to develop a theoretical system with the marketers and analyst and then product prototypes in an agile formula. The agile method is not how this system architecture is being produced and a system redesign is already in place to adjust to the waterfall method.

Currently, there is no solution to the issue at hand which is to gather data into a database and then aggregate the information based on skills and program cost to meet the needs of a diverse set of prospective and current students.

6.2 THE CONTEXT OF THE WORK



6.3 WORK PARTITIONING

Weekly meeting with Academic Marketers (Ricky Zheng): Every Friday SkillNET is expected to meet with Ricky Zheng and produce a progress report and a list of decisions for review.

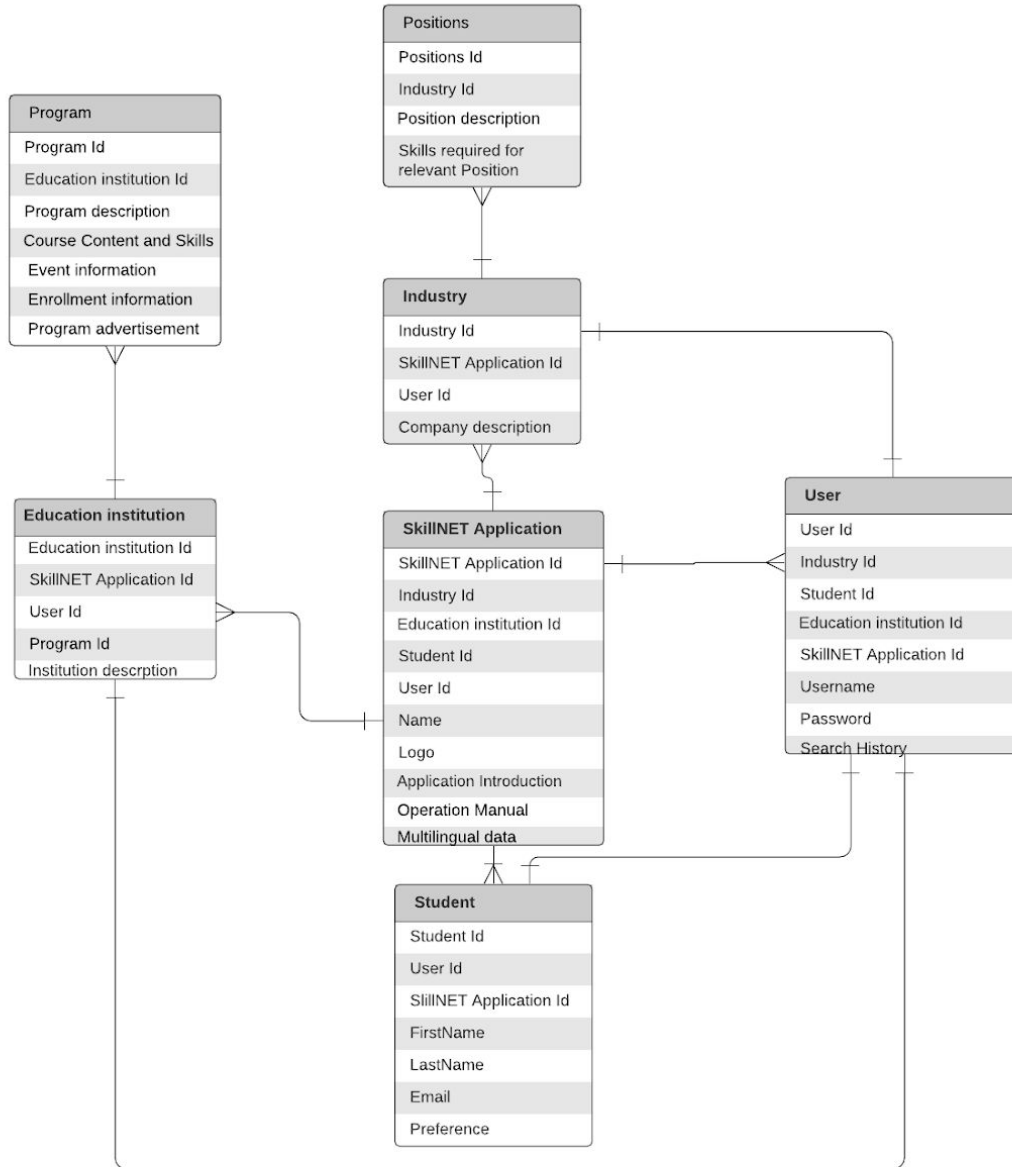
Proposed architectural design: Group 12 Solutions has 90 days to produce an architectural design to Ricky Zheng as a project check point that needs to be reviewed and commented upon before proceeding. This business action ends once Skillnet and Zheng have come to an agreement that all issues have been addressed or been deemed a compromise.

Application prototype: 90 days following the closure of the architectural design phase, the SkillNET prototype must be delivered to Ricky Zheng and Isabella Godwin for review. This business action ends once all parties have agreed to move forward and all comments, questions, concerns, and problems have been outlined in formal action plans.

Full global launch: 6 months from the closure of any feedback from the application prototype, Group 12 Solutions is expected to deliver an operational application to Ricky Zheng and Isabella Godwin. This action closes once the final solution is deemed acceptable for launch by Isabella Godwin.

7 BUSINESS DATA MODEL AND DATA DICTIONARY

7.1 Business Data Model:



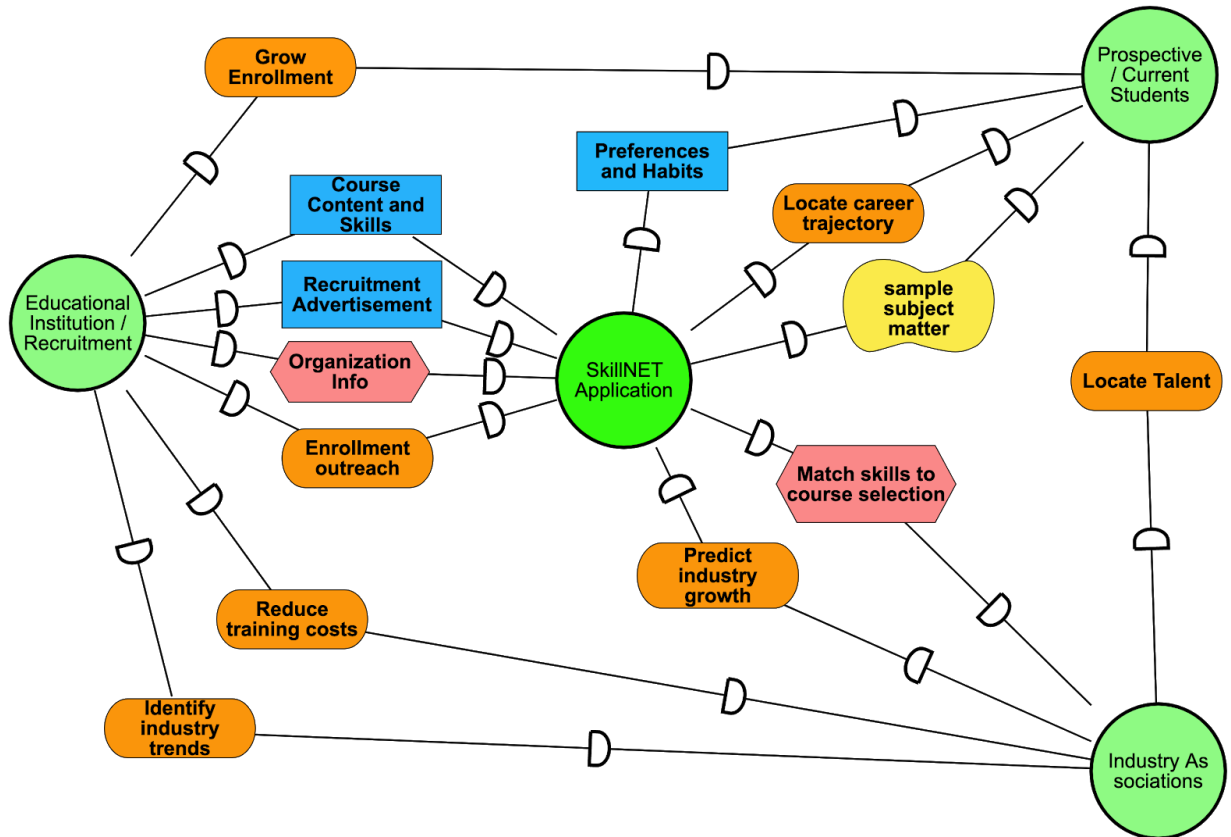
7.2 Data Dictionary:

Name	Content	Type
Programs	program id + program description	Class
Positions	position id + position description	Class
Industry	industry id + company description	Class
User	username + password	Class
Educational Institution	educational institution id + institution description	Class
SkillNET Application	SkillNet application id + name	Class
Students	student id + firstname + lastname	Class
Indent course request	{ industry id + industry_skillnet_application id + SkillNET_indent course application + SkillNET_course description + SkillNET_course budget + education institution id + education institution_application id }	Dataflow
Programs ID	*acronym of the program follow by 3 digits number*	Attribute/Element
Education institution ID	*acronym of the institution follow by 2 digits number*	Attribute/Element
Program description	*string attached to a specific program id's description *	Attribute/Element
Course content and skills	* string attached to a specific course and the related skills attained matching to industry *	Attribute/Element
Event information	*string attached to specific event*	Attribute/Element
Enrollment information	*string attached to a enrollment of a specific institution*	Attribute/Element
Program advertisement	*images or string that are shown to users about a specific program*	Attribute/Element
SkillNet application id	*6 digits number that represent each user*	Attribute/Element
User id	*initial of the users' name follow by 4 digits number*	Attribute/Element

Institution description	*string attached to a specific institution id's description*	Attribute/Element
Position id	*5 digits number that represent each position*	Attribute/Element
Industry id	*acronym of the industry follow by 1 digit number*	Attribute/Element
Position description	*string attached to a specific position id's description*	Attribute/Element
Skills required for relevant position	*string attached to the related skills attained matching to position*	Attribute/Element
Company description	*string attached to a specific company's description*	Attribute/Element
Student id	*First letter of the first name of a student follow by the full last name of a student follow by 2 digits number*	Attribute/Element
Logo	*Unique image that represent SkillNet*	Attribute/Element
Application introduction	*string attached to a specific SkillNet application id*	Attribute/Element
Operation manual	*string attached to a specific application that show applicants how to manage their application*	Attribute/Element
Multilingual data	*string that shows in different languages*	Attribute/Element
FirstName	*string that shows a student's first name*	Attribute/Element
LastName	*string that shows a student's last name*	Attribute/Element
Email	*string and number that shows a student's email address*	Attribute/Element
Preference	*string that shows keywords what a student is interested*	Attribute/Element
Username	*string and/or number that a student user to login*	Attribute/Element
Password	*minimal length of 8 characters including numbers, lowercase and uppercase alphabetic characters and symbols*	Attribute/Element
Search history	*string that shows what a student had searched*	Attribute/Element

8 THE SCOPE OF THE PRODUCT

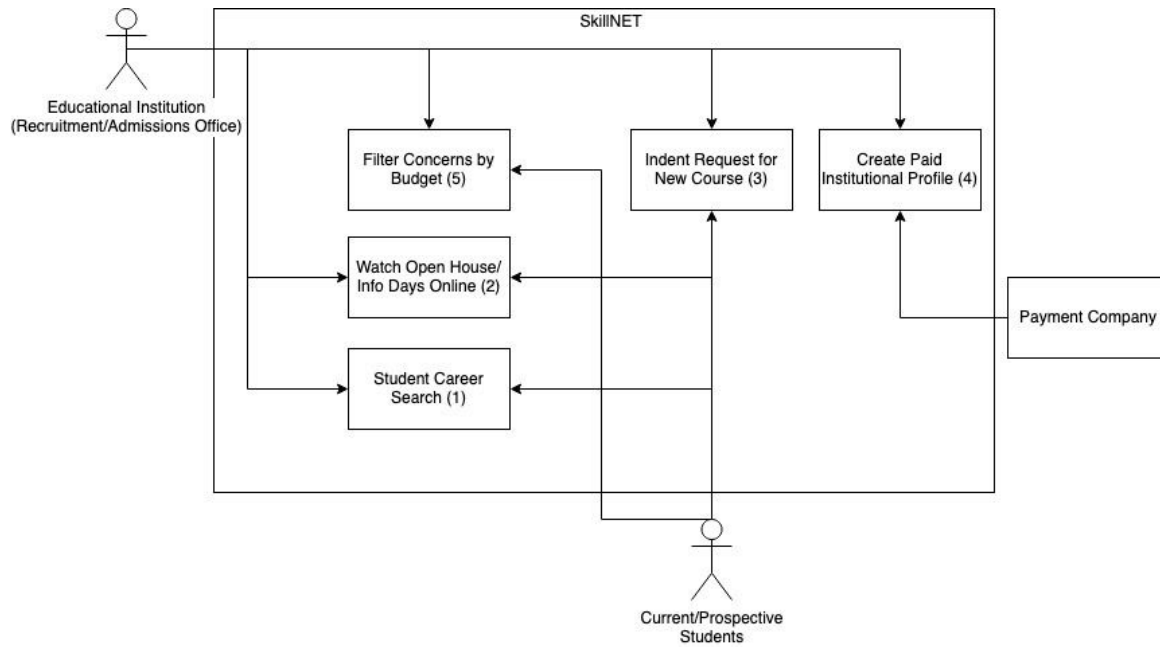
8.1 STRATEGIC DEPENDENCIES



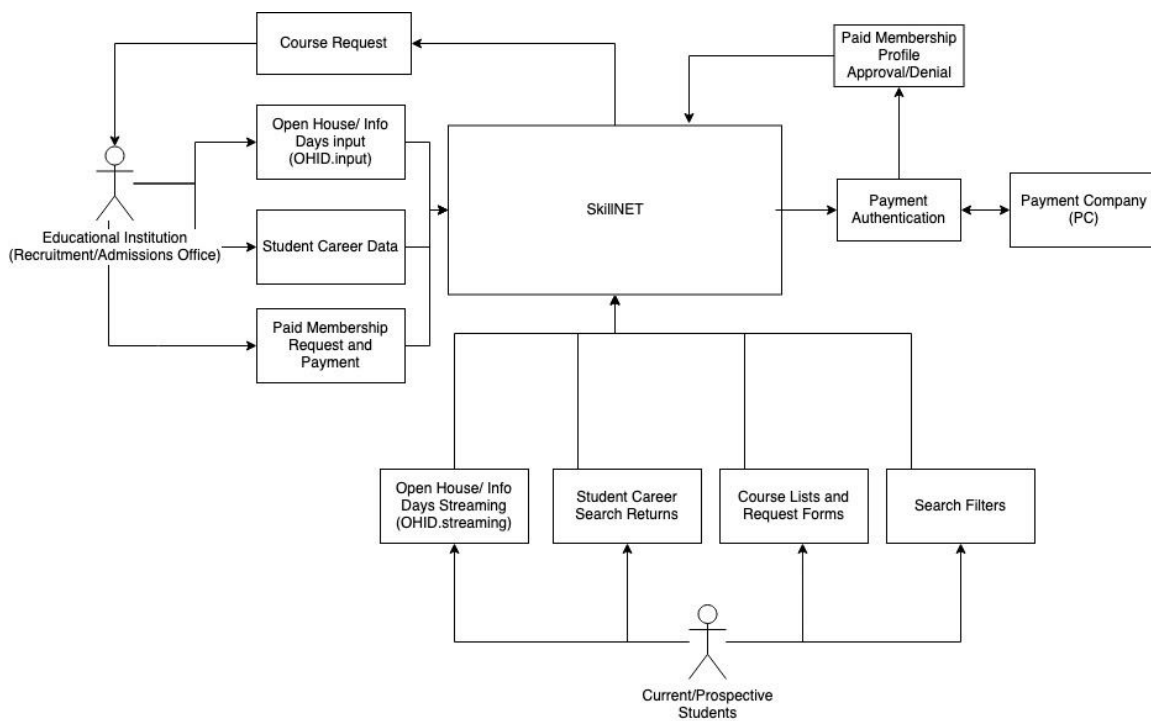
For our i*Star model, we focus on the main three stakeholders.

8.2 PRODUCT BOUNDARY

PUC Diagram:



Product Scope Diagram:



8.3 PRODUCT USE CASE TABLE

PUC No	PUC Name	Actors/ Users	Input/Output
1	Student Career Search	CPS/EI	Student Career Data/Student Career Search
2	Watch Open House/Info Days Online	CPS/EI	OHID.input/OHID.streaming
3	Indent Request for New Course	CPS/EI	Course Lists and Request Form/Course Request
4	Create Paid Institutional Profile	EI/PC	Paid Membership Request and Payment/Paid Membership Profile Approval/Denial
5	Filter Concerns by Budget	CPS/EI	Search Filters/Student Career Data

8.4 PRODUCT USE CASES

(1) PUC: STUDENT CAREER SEARCH

Name	Search by Career
Primary actor	CPS
Stakeholders and interests	<p>Student (employed/unemployed): Who seeks educational program information on how to obtain their career goal.</p> <p>Industry Associations (IA): Financial, technology, medical or trades sectors i.e. Certified Chartered Professionals (CPA,) Chartered Financial Analyst (CFA), Certified Human Resources Professional/Leader (CHRP/CHRL), Chartered Investment Manager (CIM), Registered nurse (RN), and various organizations promoting their programs and/or designations.</p> <p>Educational Institutions (EI): Such as colleges/universities who wish to promote their programs i.e. certificate, degree, designation, Masters.</p> <p>Application System (AS): The system authentication ensures the requirements and functionality of the application are met.</p> <p>System Consultants (Kathy Xinxue) who wishes to create an application that meets the business needs of the Institution.</p> <p>Academic Marketers (Ricky Xheng) who wishes to create an application to meet the marketing needs of the institution.</p>
Preconditions	<p>The student is interested in a career path by:</p> <ol style="list-style-type: none"> 1. Creating a profile. 2. Logging into the application. 3. The system authentication accepts login. 4. A career search is entered.
Success guarantees	System matches relevant program information regarding career path to the student query.
MSS	<ol style="list-style-type: none"> 1. User creates a profile 2. User inputs keyword search for desired career. 3. The database shows a list of educational programs available. 4. The user then selects a program from the list. 5. System provides relevant program information
Extensions	<ol style="list-style-type: none"> 1. No career information is available. 2. User chooses another career path. 3. Repeat step 2
Requirements	International Language Options, user authentication.
Comments	The system may have to provide suggestions to similar spelling/careers in the event no career match has been provided.
Author	Nadir Khan

(2) PUC: WATCH OPEN HOUSE/INFO DAYS ONLINE

Name	Watch in Open House/Info Days Online
Primary actor	CPS who want to view Open House/Info Days materials through the application to better inform themselves about an institution.
Stakeholders and interests	<p>Student: Wants to quickly and accurately search “Open House/Info” Days’ information. Wants to be notified un-viewed or upcoming events based on his preferences. Wants to timely get video recordings of Info Day online. Wants to ask the representative specific questions through the app and get answers timely.</p> <p>SkillNET Team: Wants to accurately and Comprehensively collect “Open House/Info” Days’ information on all schools in different countries. Wants to accurately record users’ preferences. Wants to accurately notify the user un-viewed or upcoming events based on his preferences. Wants automatic and fast updates the video recording of Info Day. Wants to keep 'message board' stable to bring a real-time communication platform.</p> <p>Educational Institution: promote its programs and attract more students.</p> <p>Governments: Wants firm ensures that all of its business activities comply with regulatory requirements.</p> <p>System Consultants (Kathy Xinxue) who wishes to create an application that meets the business needs of the Institution.</p> <p>Academic Marketers (Ricky Xheng) who wishes to create an application to meet the marketing needs of the institution.</p>
Preconditions	<ol style="list-style-type: none"> 1) The user is logged in and authenticated 2) The institution’s info day is broadcast via live stream and saved as the video for replay. 3) The associated message board for the event is activated. (The message board has 1-2 weeks’ time limit. Before or after the time limit it is regarded “inactive.”)
Success guarantees	<ol style="list-style-type: none"> 1) The preference is set up. 4) The ‘Open House/Info’ Days event is notified. 5) The ‘Open House/Info’ Days’ video is watched. 6) The question(s) to the respective institution is responded.
MSS	<ol style="list-style-type: none"> Step1. The user enters their user name and password into the system. Step2. The system validates the correctness of the entered data. Step3. The user sets preferences for their areas of interest. Step4. The system read the preferences and find a matching event(s). Step5. The system notifies relevant event to the user. Step6. The user clicks the event notification. Step7. The user browses the event information which includes program introduction, event time, location, etc. Step8. The system uploads the event video. Step9. The user watches the event video. Step10. The system activates the associated message board for the event. Step11. The user asks question(s) on the message board. Step12. The respective institution responds to the question(s).

	<p>Step13. The user reads the response(s).</p> <p>Step14. The user and respective institution iterate step 11 to 13 until all of the question(s) are responded.</p>
Extensions	<p>Alternative success route:</p> <p>Step 1-2 a. Invalid identifier</p> <ol style="list-style-type: none"> 1. App signals error and rejects entry. 2. The user retrieves or resets the password through the email. <p>Step 3 a. User already has preferences set for areas of interest.</p> <ol style="list-style-type: none"> 1. The user skips step 3 directly. <p>Step 4-5 a. The system does not find a matching event.</p> <ol style="list-style-type: none"> 1. The system notifies 'no matching event'. 2 a. The user backs to step 3 and sets up another preference. 2 b. The user ends the search and logs off. <p>Step 6-7 a. The user browses the event information but not interested.</p> <ol style="list-style-type: none"> 1 a. The user backs to step 6 and clicks another event notification. 1 b. The user backs to step 3 and sets up another preference. 1 c. The user ends the search and logs off. <p>Step 8-9. The system fails to upload the event video.</p> <ol style="list-style-type: none"> 1. The user does not watch the event video. 2 a. The user backs to step 6 and click another event notification. 2 b. The user skips step 9 directly asked the question. <p>Step 10-14. The system fails to activate the associated message board for the event.</p> <ol style="list-style-type: none"> 1. The user report problem to SkillNET Team. 2 a. The problem is fixed. 3. The user continues to step 11-14. 2 b. The problem cannot be fixed. 3 a. The user backs to step 6 and click another event notification. 3 b. The user ends the search and logs off. <p>Step 11-14. The user has no question to ask.</p> <ol style="list-style-type: none"> 1 a. The user ends the search and logs off.
Requirements	Language internationalization on the text displayed.
Comments	Academic institutions would use a separate account which broadcasts events. They would also receive a separate tag on the message board to identify their position.
Author	Xie Xinyue

(3) PUC: INDENT REQUEST FOR NEW COURSE

Name	Indent request for new course
Primary actor	Professional Association Representative
Stakeholders and interests	<p>SkilNET Staff – The success and operation of the app is tied to the team.</p> <p>Professional Association – The primary stakeholder. Submits indent request to Academic institution representatives on the SkillNet platform regarding a specific applied skill that is sought after in the primary actor’s industry.</p> <p>Academic institutions – Indent Request for New Course allow classes to identify industry trends early on the process which allows them to increase enrolment with enticing employment placement rates. (e.g: moving over to R from SPSS much earlier)</p> <p>Businesses – Benefits from higher number of skilled workers with specific desired skills now available at the workforce thereby reducing their in-house training costs.</p> <p>Students – Interested in finding career outcomes are able to have some end point for studying the subject. This does not suggest that this is their final career—simply a more likely outcome of employment would generate enthusiasm and curiosity.</p> <p>Scholarship sponsors – Interested in looking for educational opportunities that allow scholarship recipients to give back to the community; assuming the industry does not get saturated with labour.</p> <p>Online learning platforms – interested in collecting content creators who curate programs based on market demand.</p> <p>Ministry of training – Benefits from potential boon in employment statistics—however ostensible it may be.. but that is not relevant to this assignment.</p>
Preconditions	<ol style="list-style-type: none"> 1) Page where “Professional Association” accounts can directly bring indent proposals (to teach certain skills) to “Academic Institution representative” accounts. 2) The user is logged in and authenticated and has access to the set of privileges afforded to professional associations. 3) There are enthusiasm reports that are generated for reference (as metrics) both on the types of courses students click on. 4) There is a “Budget allocation” module that allows negotiation between the primary actor and all academic institutions who can assess the proposal (and accept or reject).

Success guarantees	<ol style="list-style-type: none"> 1) Login authentication and privileges work as intended. 2) Both “Professional Association” and “Academic Institution representative” are able to view the status of proposals and interact at the budget allocation interfaces. 3) The app successfully advertises the new course selection to “Student” accounts. 4) Acceptance and Rejections of proposals are clear to all parties and recorded.
MSS	<ol style="list-style-type: none"> 1) User logs in to application. 2) User sets up proposal based on industry trend and attaches enthusiasm report on associated fields. (e.g.: If the proposal is to teach Python for data science jobs, they would attach reports of students taking R for data science jobs.) 3) App notifies academic institution of this particular professional association. 4) Professional association and Academic institution agree to terms in negotiation. 5) New course section is produced and advertised on SkillNet.
Extensions	<p>Alternative success route:</p> <ol style="list-style-type: none"> 4a) Negotiations fail, proposal is rejected by a specific Academic institution’s rep. 5a) Both parties view the indent status as rejected. 6a) Professional association submits indent request to another academic institution. <p>Failure:</p> <ol style="list-style-type: none"> 1b) User cannot authenticate as the appropriate account type. 2b) Proposal and indent request crashes.
Requirements	User privileges; Student preferences and habits are aggregated (anonymized at source to prevent prejudicial treatment of students based on race/gender/sexuality/political affiliation/etc.); Curating course content proposal forms.
Comments	This section looks to help industry work with educational institutions to create new classes for desired skills.
Author	Asif Ayenun

(4) PUC: CREATE PREMIUM INSTITUTIONAL PROFILE

Name	Create Premium Institutional Profile
Primary actor	Institutional promoter
Stakeholders and interests	<ol style="list-style-type: none"> 1. Prospective and Current students who wish to know what skills training programs offer. 2. Industry experts looking to gather data about programs. 3. Institutional Promoters who wish to increase enrollment by increasing their institutions visibility within SkillNet. 4. SkillNet team who wish to sell profile memberships. 5. Payment companies who wish to profit off of payment authentication. 6. System Consultants (Kathy Xinxue) who wishes to create an application that meets the business needs of the Institution. 7. Academic Marketers (Ricky Xheng) who wishes to create an application to meet the marketing needs of the institution.
Preconditions	<p>The user needs to have access to program information data.</p> <p>The user needs to have a valid login—this requires additionally verification to ensure that the institution is not being misrepresented.</p> <p>The user must pay a fee to publish a premium profile.</p> <p>The database needs to be available to store data.</p>
Success guarantees	The institution is able to create a public profile that includes robust and diverse information for prospective students. Institutions have separate profile options and different membership plans to meet their specific needs.
MSS	<ol style="list-style-type: none"> 1. The user authenticates their login. 2. The user creates a profile. 3. The user pays a membership fee. 4. Upload program information to their intuitional profile. 5. Publish the information.
Extensions	<p>Failure cases:</p> <p>A)</p> <ol style="list-style-type: none"> 1. Authenticate the login. 2. Create a profile 3. The fee is unsatisfactory and the case is terminated. <p>B)</p> <ol style="list-style-type: none"> 1. Authenticate the login. 2. Pay the fee. 3. Create premium institutional profile 4. Upload insufficient information making inaccessible to other users.
Requirements	International language options, user authentication, a database, payment methods.
Comments	In order for this to function, the database needs to be populated with information the user needs—this assumes that the system will contain all relevant information for the prospective student, which may be time consuming for the user.
Author	Andrew Wiebe

(5) PUC: FILTER CONCERNS BY BUDGET

Name	Filter Concerns by Budget
Primary actor	Students who wants to go study abroad
Stakeholders and interests	<p>Students – They want to pursue their education in foreign countries</p> <p>SkillNet – Combine information and provide to the users that match their requirement</p> <p>Institutional Administration – Provide information to the students when they contact the administration</p> <p>Institutions – Advertising themselves on the platform</p> <p>System Consultants (Kathy Xinxue) who wishes to create an application that meets the business needs of the Institution.</p> <p>Academic Marketers (Ricky Xheng) who wishes to create an application to meet the marketing needs of the institution.</p>
Preconditions	<ol style="list-style-type: none"> 1) SkillNet collects information about expenses of every program 2) Institutions advertise themselves on the platform 3) SkillNet cooperate with administrations of programs and prepare them to be able to answer the questions that students have 4) Make sure all the technical stuff works
Success guarantees	<ol style="list-style-type: none"> 1) Information must sort by categories 2) All information must be accurate 3) No technical problems
MSS	<ol style="list-style-type: none"> 1) Students log in to their SkillNet account 2) Select advanced search 3) Select budget range 4) Select countries that they wish to go 5) Get the result of search, a list of programs selection 6) Select interested program 7) Direct message with the administrations of programs
Extensions	<ol style="list-style-type: none"> 1) Log in fail 2) Interested countries not in the database 3) Interested programs could not meet their requirement
Requirements	<ol style="list-style-type: none"> 1. Data storage 2. Available message channel
Comments	For the accuracy information and help users to select the best program for them, all the information collect from third party website and from institutions must be verify first
Author	Minghuai Zheng

9 FUNCTIONAL REQUIREMENTS

Requirement ID: NK01	Requirement Type: Functional	PUC: Student Career Search
Description: The application creates student profiles based on information provided by the student.		
Rationale: Application obtains information about the user i.e. student, employed, highest level of education, courses taken, work experience.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Profile information should not take longer than 10 minutes to enter before prompting "Do you require more time" is displayed.		
Supporting Materials:	Conflicts: (NK2-NK10); (XX15)	

Requirement ID: NK02	Requirement Type: Functional	PUC: Student Career Search
Description: The application shall request the student to login and authenticate username.		
Rationale: The application shall verify the identity of users before allowing them to use all of its functions.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Login ID and password is requested and verified before allowing system access.		
Supporting Materials:	Conflicts: (NK03-NK10); (XX15, XX09)	

Requirement ID: NK03	Requirement Type: Functional	PUC: Student Career Search
Description: The application shall request the student to input a career choice.		
Rationale: Require information about the user i.e. student, employed, highest level of education, courses taken, work experience.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Career choice to be entered or selected from the drop down menu within 2 minutes before the user is prompted to "Please enter career search".		
Supporting Materials:	Conflicts: (NK04); (XX15)	

Requirement ID: NK04	Requirement Type: Functional	PUC: Student Career Search
Description: Database search.		
Rationale: Application searches the career database for a list of program information		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Career choice entered by student has to match career information in database, otherwise user is requested to check spelling or enter another search.		
Supporting Materials:	Conflicts: (NK05-NK10, NK14); (XX11, XX13); (AW11); (MZ12, MZ14)	

Requirement ID: NK05	Requirement Type: Functional	PUC: Student Career Search
Description: Career/program information displayed.		

Rationale: The application produces detailed program information in a report summary.	
Originator: Kathy Xinxue (System Consultant)	
Fit Criterion: Program results must match the career selected by the student.	
Supporting Materials:	Conflicts: (NK14); (XX11, XX13); (AW11); (MZ12, MZ14)

Requirement ID: NK06	Requirement Type: Functional	PUC: Student Career Search
Description: Career program data entered/updated by Industry Association and/or Educational Institution.		
Rationale: The application must allow Industry Associations and Educational Institutions to add, edit, and delete program information.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Users can upload their program information through application.		
Supporting Materials:	Conflicts: (NK14); (MZ12, MZ14)	

Requirement ID: NK07	Requirement Type: Functional	PUC: Student Career Search
Description: Print/Export results.		
Rationale: The application should allow the student the options to print/export the program results in various options.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Various options to print, as well as export program results i.e. PDF, Word, etc.		
Supporting Materials:	Conflicts: (NK14); (MZ12, MZ14)	

Requirement ID: NK08	Requirement Type: Functional	PUC: Student Career Search
Description: Compare programs		
Rationale: Students should be allowed an option to compare various programs in a tabular format.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Check box option to "save a selected to compare with another program" should be allowed as an option.		
Supporting Materials:	Conflicts: (NK14); (AW11)	

Requirement ID: NK09	Requirement Type: Functional	PUC: Student Career Search
Description: Contact us		
Rationale: The application should users to contact the system administrator with any questions or concerns.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Link to		
Supporting Materials:	Conflicts: (NK14)	

Requirement ID: NK10	Requirement Type: Functional	PUC: Student Career Search
Description: Passwords		
Rationale: The system shall let users to log in with passwords.		

Originator: Kathy Xinxue (System Consultant)	
Fit Criterion: Passwords required to be at least 8 characters, containing both small and capital letters, numbers and special characters.	
Supporting Materials:	Conflicts: (NK14)

Requirement ID: XX01	Requirement Type: Functional	PUC: Watch Open House/Info Days online
Description: The students are able to use their username and password to log in the system.		
Rationale: To be able to login to their own account which contains their personal setting and personal information.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given student on SkillNET app's login page. When he enters the correct user name and password. Then he can log in to the system.		
Supporting Materials: N/A	Conflicts: (NK2-10); (XX2-XX10, XX15)	

Requirement ID: XX02	Requirement Type: Functional	PUC: Watch Open House/Info Days online
Description: The students are able to set up preferences for their areas of interest.		
Rationale: To be able to search for the Info Days that matches his preference.		
Originator: Ricky Zheng (Application Developer)		
Fit Criterion: Given the student in his account. When he set up his preference in his account. Then the system shows the related Info Days.		
Supporting Materials: N/A	Conflicts: (XX1, XX15); (NK14, NK15); (AW11)	

Requirement ID: XX03	Requirement Type: Functional	PUC: Watch Open House/Info Days online
Description: The system shall read the student's input data.		
Rationale: To be able to store the data and analyze the student's request and respond to it. (list all Info Days which matches the student's preference.)		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given the student in his account. When the student sets up his preferences. Then the system should store and analyze those input data.		
Supporting Materials: N/A	Conflicts: (NK10, NK14, NK15); (XX11, XX13, XX15); (AW11)	

Requirement ID: XX04	Requirement Type: functional	PUC: Watch Open House/Info Days online
Description: The system shall find the matching event(s) base on the student's preference.		
Rationale: To be able to help students screen out target Info Days. After this, the system can notice relevant events to the student.		
Originator: Ricky Zheng (Application Developer)		
Fit Criterion: Given the student in his account. When the system read his preference. Then the system should respond to the matching event(s).		

Supporting Materials: N/A	Conflicts: (XX2); (NK1; NK6)
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Requirement ID: XX05	Requirement Type: functional	PUC: Watch Open House/Info Days online
Description: The students shall receive the relevant events notification.		
Rationale: The student gets the information that there is an Info Day he may interest. And he can save a lot of searching time.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given the student in his own account. When the system finds matching Info Days. Then the system should notify the Info Day to the student.		
Supporting Materials: N/A	Conflicts: (NK2); (XX1-XX2)	

Requirement ID: XX06	Requirement Type: functional	PUC: Watch Open House/Info Days online
Description: The students are able to browse the Info Day information.		
Rationale: The student is able to find Info Day's information which includes program introduction, event time, location, etc. And he can decide whether to attend the event or not.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given the student in his account. When the user clicks the Info day information. Then the system should show all the event details to the student.		
Supporting Materials: N/A	Conflicts: (NK2); (XX1, XX2)	

Requirement ID: XX07	Requirement Type: Functional	PUC: Watch Open House/Info Days online
Description: The system shall upload the event video.		
Rationale: Students want to know the content of the Info Day, but they cannot physically being there. The app is able to attract more students by uploading the event video.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given the student in his account. Within one day after the event hold. The system should upload the event recording video to the app and the student can watch the video online.		
Supporting Materials: N/A	Conflicts: (NK6)	

Requirement ID: XX08	Requirement Type: Functional	PUC: Watch Open House/Info Days online
Description: The system shall activate the associated message board for the event.		
Rationale: A lot of students ask some questions to the respective institutions. The app provides students a real-time communication platform with the respective institutions. Which will bring repeat users to the App.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given the student in his account. Within one day after the event hold. The system should activate the associated message board for the event and the student should be able to ask questions to the respective institution on the board.		

Supporting Materials: N/A	Conflicts: (NK2, NK14); (XX1, XX2); (AW11); (MZ14, MZ15)
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Requirement ID: XX09	Requirement Type: Functional	PUC: Watch Open House/Info Days online
Description: The students are able to ask the question(s) on the message board.		
Rationale: To be able to get help with respective institutions. (The respective institution will answer their questions)		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given the students in his account. Within one day after the event hold. He should be able to ask question(s) to the respective institution by the associated message board.		
Supporting Materials: N/A	Conflicts: (NK2, NK14); (XX1, XX2); (AW11); (MZ14, MZ15)	

Requirement ID: XX10	Requirement Type: Functional	PUC: Watch Open House/Info Days online
Description: The respective institution shall respond to the students' question(s) on the message board.		
Rationale: To be able to find students' interest points and the potential problems of the program. At the same time advertise the program to attract more students.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Given the students in his account. When the student asks the question(s) on the associated message board. Then the institution should answer those questions.		
Supporting Materials: N/A	Conflicts: (NK2, NK14); (XX1, XX2); (AW11); (MZ14, MZ15)	

Requirement ID: AA01	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall register user accounts into three distinct types which have different access permissions.		
Rationale: Each account type contributes differently to the app; distinct permissions grant access to areas of the app that is relevant to each contributor.		
Originator: Asif Ayenun (SkillNET)		
Fit Criterion: Users shall be registered as Students, Professional Association representative, or Academic Institution representative with unique access permissions.		
Supporting Materials: Indent Request for New Course	Conflicts: (XX1, XX19); (NK1);	

Requirement ID: AA02	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall authenticate Professional Associations and Academic institutions after they submit credential information.		
Rationale: Salient to keep networks secure by permitting only valid academic institutions and professional associations register as such.		

Originator: Asif Ayenun (SkillNET)	
Fit Criterion: Professional associations and Academic Institutions are validated within 48 hours of submitting their organization credentials.	
Supporting Materials: Indent Request for New Course	Conflicts: (AW02)

Requirement ID: AA03	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall grant access to Professional Association to create indent requests for course proposals.		
Rationale: Professional associations need to create indent requests for their proposed courses with information about the type of equipment necessary for training and how much they will subsidize collaboration partners.		
Originator: Asif Ayenun (SkillNET)		
Fit Criterion: The Professional association representatives shall have access to an area of the app where they design their course proposal.		
Supporting Materials: Indent Request for New Course	Conflicts: (AW11)	

Requirement ID: AA04	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall auto-populate Professional Association's list of potential collaboration partners with registered Academic Institutions.		
Rationale: Area of the app where Professional Association representatives can view registered Academic Institutions who may collaborate to deliver the proposed course.		
Originator: Asif Ayenun (SkillNET)		
Fit Criterion: A Professional Association representative shall be able to view a list of all registered Academic institutions after accurately completing their indent request.		
Supporting Materials: Indent Request for New Course	Conflicts: (AW11)	

Requirement ID: AA05	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall alert Academic Institution accounts when they have a new indent request to create a course.		
Rationale: Academic institutions need to know of pending indent requests.		
Originator: Asif Ayenun (SkillNET)		
Fit Criterion: Academic accounts shall be alerted of pending within 1 second of logging in.		
Supporting Materials: Indent Request for New Course	Conflicts: (NK14); (XX19); (AW11)	

Requirement ID: AA06	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall limit Professional associations from sending multiple indent requests to 1 Academic institution.		

Rationale: Necessary to prevent spamming and clogging up inboxes	
Originator: Asif Ayenun (SkillNET)	
Fit Criterion: 1 Professional Association representative can only submit 1 indent request to 1 Academic institution at a given time.	
Supporting Materials: Indent Request for New Course	Conflicts: (NK15); (XX13); (MZ8-MZ10, MZ15)

Requirement ID: AA07	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall record both enrolment rate and completion rate of students to generate an enthusiasm report.		
Rationale: Enthusiasm reports deliver consolidated & updated information which facilitate decision making and planning for future courses.		
Originator: Asif Ayenun (SkillNET)		
Fit Criterion: System shall track and record data of student activity pertaining to course enrolment and completion.		
Supporting Materials: Indent Request for New Course	Conflicts: (NK14); (AW11); (MZ8-MZ10, MZ15)	

Requirement ID: AA08	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall accommodate negotiation on budgetary needs for both Academic Institution and Professional Association within the app.		
Rationale: Offering a class may require licensing or buying new hardware which need to be negotiated by both parties before a course section is added.		
Originator: Asif Ayenun (SkillNET)		
Fit Criterion: The reported costs associated with delivering the proposed course and negotiation messages have been stored in the system.		
Supporting Materials: Indent Request for New Course	Conflicts: (NK15); (XX11); (MZ8-MZ10, MZ15)	

Requirement ID: AA09	Requirement Type: Functional	PUC: Indent Request for New Course
Description: System shall allow users to refine search results by modifying the search criteria to get a subset of the original search results.		
Rationale: Search mechanism is integral for locating specialized skills; ability to refine searches allow students to find courses that build upon classes they may have already completed.		
Originator: Asif Ayenun (SkillNET)		
Fit Criterion: System shall prompt for search refinements if original search resulted in more than 2 pages of content.		
Supporting Materials: Indent Request for New Course	Conflicts: (NK15); (XX11); (MZ8-MZ10, MZ15); (AW11)	

Requirement ID: AA10	Requirement Type: Functional	PUC: Indent Request for New Course
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Description: System shall display a drop-down suggestion list below the search panel during ongoing searches which match input to available/potential field attributes.	
Rationale: Helps users find new courses through the suggestions on the drop down panel as the user types their query.	
Originator: Asif Ayenun (SkillNET)	
Fit Criterion: System should respond with a drop-down suggestion list after the first word has been typed and continue to refine its suggestions within 2 seconds of every new word thereafter.	
Supporting Materials: Indent Request for New Course	Conflicts: None

Requirement ID: AW01	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: The user shall be able to authenticate their identity as an educational institution.		
Rationale: There needs to be controls in place to ensure that institutions are not misrepresented as well as ensure that each user in SkillNet is official associated with an institution.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Only the user with the appropriate credentials will be able to edit or update Institutional profile.		
Supporting Materials: See AW11 for Data Security Requirements.		Conflicts: (AW2-10); (XX15)

Requirement ID: AW02	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: The user shall be able to upload course catalogues.		
Rationale: The course offerings are important information to advertise to prospective students.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: The course listings will be displayed for other users to see in a readable format.		
Supporting Materials: example: https://www.coursera.org/browse		Conflicts: (AW3-10)

Requirement ID: AW03	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: The user shall be able to associate skills with particular courses.		
Rationale: Not all courses offer the same skill sets and the user will want to advertise to prospective students what skills their courses provide.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Users can access skills offerings are displayed in a readable format for other users and are associated with courses.		
Supporting Materials: See example of skill association: https://www.skillsuccess.com/courses/		Conflicts: (NK15); (XX11)

Requirement ID: AW04	Requirement Type: Functional	PUC: Create Premium Institutional Profile
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Description: The user will be able to upload alumni testimonies to their profile.	
Rationale: The institution may have high profile alumni that they wish to use to demonstrate the long term results of their program.	
Originator: Ricky Zheng (Academic Marketer)	
Fit Criterion: Alumni testimonies will be displayed for other users in a readable and understandable format.	
Supporting Materials: Example: https://alumni.utoronto.ca/news-and-stories/featured-alumni	Conflicts: (AW11)

Requirement ID: AW05	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: The user will be able to upload program cost and estimated living costs.		
Rationale: The institution may want to inform prospective students about the expected living costs and tuition of their program.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Users are able to find the cost descriptions of the program in a clear and understandable format.		
Supporting Materials: See example: https://www.studentlife.utoronto.ca/hs/living-costs	Conflicts: N/A	

Requirement ID: AW06	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: The user will be able to upload possible funding options.		
Rationale: The institution may want to outline the financial support structure for undergraduate and graduate level students in their program.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Users will be able to access financial support information in a format that is understandable and comprehensive.		
Supporting Materials: See example: https://www.sgs.utoronto.ca/awards-funding/	Conflicts: (NK15); (XX11)	

Requirement ID: AW07	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: There must be payment options for the user to pay for the premium membership.		
Rationale: Skillsnet requires payment options so that institutions may purchase their premium membership package.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Users will be able to pay for their memberships using typical payment forms.		
Supporting Materials: See PUC for rationale.	Conflicts: (NK15); (XX11); (AA16); (AW11)	

Requirement ID: AW08	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: The institution will be able to list all of their initiatives, clubs, and projects that aim to help minorities in an academic setting.		
Rationale: The institution may wish to demonstrate their commitment to various social and restorative justice topics that may make their institution more desirable to minorities who wish to feel included.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Users will be able to browse on-campus initiatives, clubs, and projects that are associated with select groups and have access to links to additional resources (such as group websites, Facebook groups, etc).		
Supporting Materials: See example of minority commitments: https://sgdo.utoronto.ca/students/lgbtq-student-organizations/		Conflicts: (XX18); (AW11)

Requirement ID: AW09	Requirement Type: Functional	PUC: Create Premium Institutional Profile
Description: The institution will be able to publish dates and information for recruitment events.		
Rationale: The user may wish to share public events to promote their institution.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: Users will be able to view information, including the date, about recruitment events.		
Supporting Materials: See example: https://www.studentlife.utoronto.ca/cc/networking		Conflicts: (XX18); (AW11)

Requirement ID: AW10	Requirement Type: Functional	PUC: AW1
Description: The user will be able to upload photographs of their institutional profile		
Rationale: Part of the universities advertising scheme will likely include the aesthetics of certain iconic spaces.		
Originator: Ricky Zheng (Academic Marketer)		
Fit Criterion: The photographs uploaded by the Institutional Promoter will be visible to the public in a satisfactory resolution and aesthetically pleasing format.		
Supporting Materials: Examples of iconic sites: https://www.utoronto.ca/news/doors-open-toronto-12-things-you-must-see-u-t		Conflicts: (XX18); (AW11)

Requirement ID: MZ01	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall be able to let student login without any technical error		
Rationale: Students can access to their account anytime anywhere		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Any user of SkillNet can access to their account without any problem		
Supporting Materials: None		Conflicts: (XX15, XX19); (NK2-10)

Requirement ID: MZ02	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall have advanced search feature		

Rationale: Allow students can search schools and programs base on their interest	
Originator: Kathy Xinxue (System Consultant)	
Fit Criterion: Students able to see the interface of the search bar with various options	
Supporting Materials: None	Conflicts: (MZ12, MZ15); (NK14, NK 15); (XX4, XX13, XX15)

Requirement ID: MZ03	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall have search feature that base on budget		
Rationale: Allow students to select schools or programs under their budget range		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The estimated budget range including tuition and living expenses less or equal to the amount of budget that the students select		
Supporting Materials: None	Conflicts: (MZ03, MZ15); (XX11, XXX13, XX15)	

Requirement ID: MZ04	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall have search feature that base on country		
Rationale: Allow students to select schools or programs base on the countries that they are interested		
Originator: Kathy Xinxue (System Consultant)t		
Fit Criterion: The search result only contains the countries that the students select		
Supporting Materials: None	Conflicts: (NK15); (XX11, XX13)	

Requirement ID: MZ05	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall allow students direct message the administration of schools		
Rationale: Allow students get information from the schools they are interested directly		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Students and the administration staff can receive message from each other on time and get notification when new message comes in		
Supporting Materials: None	Conflicts: No conflicts with other requirement	

Requirement ID: MZ06	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall notify students when the administration of school message them		
Rationale: Students can receive message on time so they can get all the information they want		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: When message comes, students can receive a notification instantly		
Supporting Materials: None	Conflicts: No conflicts with other requirement	

Requirement ID: MZ07	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall have pop-up ad from schools		
Rationale: Allow schools to advertise themselves to attract students		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: When students login to their account, ad will pop-up on their home page		
Supporting Materials: None	Conflicts: No conflicts with other requirement	

Requirement ID: MZ08	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall update the students about the status of their search		
Rationale: Notifying students from time to time will keep the students interested and remind them to continue searching for the schools or programs they are interested		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Students will get notification of the schools or programs they search about the status from time to time		
Supporting Materials: None	Conflicts: (NK14); (XX11, XX13, XX18); (MZ12, MZ14, MZ15)	

Requirement ID: MZ09	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall be able to notify the students about the deadline of the application		
Rationale: Students won't miss the deadline of the application if they are interested to apply		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Students will get updates when the deadline is 1 month, 2 weeks, 1 week, 3 days, and last day away		
Supporting Materials: None	Conflicts: (XX11, XX13); (MZ12, MZ14, MZ15)	

Requirement ID: MZ10	Requirement Type: Functional	PUC: Budgetary Concern
Description: The product shall allow students to see the profile of the school that they are interested		
Rationale: Allow students to know more information about the schools that they are interested		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: When students are interested in a specific school, they can see the profile of the school anytime anywhere		
Supporting Materials: None	Conflicts: (NK14); (XX11, XX13); (MZ12, MZ14, MZ15)	

NON-FUNCTIONAL REQUIREMENTS

Requirement ID: NK11	Requirement Type: Non-Functional - Performance	PUC: Student Career Search
Description: The system must respond to queries in less than 0.5 seconds.		
Rationale: The applications overall performance will be evaluated measuring the response of the query and report times.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Application and career program results should display within 5 seconds.		
Supporting Materials:	Conflicts: Different response times: (XX16); (AW17); (AA11)	

Requirement ID: NK12	Requirement Type: Non-Functional - Performance	PUC: Student Career Search
Description: Application stability.		
Rationale: Will the system be able to handle a large volume of users that search or input information at the same time.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The system should not freeze or lag a minimal rate if large volumes of data are being entered by the IA and/or EI.		
Supporting Materials:	Conflicts: Conflicts with other capacity requirements that outline action: (AA13); (NK17); (AW16); and differing speed requirements: (XX16); (AW17); (MZ16); (AA11)	

Requirement ID: NK13	Requirement Type: Non-Functional - Reliability	PUC: Student Career Search
Description: Reliability/Accuracy and quality of data results.		
Rationale: Accuracy and the quality of the search results should be monitored, to ensure that the student queries are producing the correct program results.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Students will leave a high % of positive feedback, or low % of negative feedback.		
Supporting Materials:	Conflicts: Differing reliability requirements: (XX17, XX20); (MZ11)	

Requirement ID: NK14	Requirement Type: Non-Functional - Security	PUC: Student Career Search
Description: Security		
Rationale: The user profile information shall be secure and remain confidential and encrypted.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The system shall encrypt all confidential data using the RSA algorithm.		

Supporting Materials:	Conflicts: Data access requirements (NK04-NK09); (XX02, XX03, XX06, XX8-XX10); (AA04, AA05, AA07); (MZ02; MZ08; MZ10)
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Requirement ID: NK15	Requirement Type: Non-Functional - Ease of Use	PUC: Student Career Search
Description: Usability/Ease of use		
Rationale: The application shall be easy to use by all users i.e. Students, Industry Associations, Educational Institutions.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: User dissatisfaction/negative feedback should be less than 2%.		
Supporting Materials: See usability heuristics for suggested heuristic consistency and standards and match with usability guidelines for Android and iOS to ensure consistency: https://developer.apple.com/design/human-interface-guidelines/ios/overview/themes/ ; https://developer.android.com/design . https://www.nngroup.com/articles/ten-usability-heuristics/	Conflicts: Features that may hinder ease of use (NK04, NK05); (XX03, XX06); (AA06; AA08, AA09); (AW03, AW06, AW07); (MZ02-MZ04, MZ08-MZ10)	

Requirement ID: NK16	Requirement Type: Non-Functional - Cultural	PUC: Student Career Search
Description: Cultural		
Rationale: The application should be available in several languages for the foreign students.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Option to select language based on country flag displayed on main page.		
Supporting Materials:	Conflicts: Differing language requirements: (AW19)	

Requirement ID: NK17	Requirement Type: Non-Functional - Capacity	PUC: Student Career Search
Description: Capacity		
Rationale: The application shall allow several searches to be made at the same time without downgrading performance.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The system support 1000 transactions per day/100 per second.		
Supporting Materials:	Conflicts: Similar features: (NK18); differing speed and capacity requirements: (AA12); (AW13)	

Requirement ID: NK18	Requirement Type: Non-Functional - Scalability	PUC: Student Career Search
Description: Scalability		

Rationale: Application should be able to show or recommend the user previous searches, in order to recommend similar careers.	
Originator: Kathy Xinxue (System Consultant)	
Fit Criterion: System cache should keep log of previous career searches.	
Supporting Materials:	Conflicts: Similar features: (NK17); Security issues with data caching: (NK14); (XX19); (AA15, AA16); (AW11); (MZ18)

Requirement ID: JR01 ¹	Requirement Type: Non-Functional - Accessibility	PUC: Student Career Search
Description: The application shall be available 99.9% of the time.		
Rationale: The application shall be available at all times with a small margin of error to recover.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The user should be able to log in within 5 seconds in 95% of the cases.		
Supporting Materials:	Conflicts: Other reliability response requirements with different scopes: (NK20); (AA13); (AW16)	

Requirement ID: NK20	Requirement Type: Non-Functional - Reliability	PUC: Student Career Search
Description: Failover testing will be done to verify what happens when the system is overloaded with searches or crashes.		
Rationale: To ensure that the application remains stable even with a high volume of users.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Recovery from failure or server crashes should be within 3 minutes before switching to backup server.		
Supporting Materials:	Conflicts: Other reliability response requirements with different scopes: (AA13); (JK07); (AW16)	

Requirement ID: XX11	Requirement Type: non-functional - usability	PUC: Watch Open House/Info Days online
Description: The product shall be easy to use on the first attempt by a member of the public without training.		
Rationale: This is a new product and we need our customers to voluntarily switch to using it.		
Originator: Andrew Wiebe (SkillNET Team)		
Fit Criterion: Ninety percent of a panel that is representative of the customer base shall successfully complete sign in and set up preference within 4 mins of their first encounter.		
Supporting Materials: See usability heuristics for suggested heuristic consistency and standards and match with usability guidelines for Android and iOS to ensure consistency:	Conflicts: Advanced features that may not be intuitive: (NK04, NK05); (XX03, XX06); (AA06; AA08, AA09); (AW03, AW06, AW07); (MZ02-MZ04, MZ08-MZ10)	

¹ Joint Requirement 01 NK19; AW18

https://developer.apple.com/design/human-interface-guidelines/ios/overview/themes/; https://developer.android.com/design. https://www.nngroup.com/articles/ten-usability-heuristics/	
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Requirement ID: XX12	Requirement Type: non-functional - operational	PUC: Watch Open House/Info Days online
Description: The products shall work on the last four releases of the Android system and Apple system.		
Rationale: The student is able to directly download and use the app on their own devices.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The student has a phone with an Android system and laptop with an Apple system. When he alternates use two devices. He can download and use the app in both systems.		
Supporting Materials: Robertson and Robertson(2012) -Mastering the Requirements Process_Getting Requirements Right	Conflicts: Other similar requirements with dissimilar boundaries: (AA17); (AW12); (MZ20)	

Requirement ID: XX13	Requirement Type: Non-functional usability	PUC: Watch Open House/Info Days online
Description: The product shall be intuitive.		
Rationale: The students must find it easy and intuitive; otherwise, they will not use it.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Eighty percent of students shall be able to find their interested Info Day(s) within 10 minutes of encountering the product for the first time without reference to any out-of-product help.		
Supporting Materials: See usability heuristics for suggested heuristic consistency and standards and match with usability guidelines for Android and iOS: https://developer.apple.com/design/human-interface-guidelines/ios/overview/themes/; https://developer.android.com/design. https://www.nngroup.com/articles/ten-usability-heuristics/	Conflicts: Advanced features that may not be intuitive: (NK04, NK05); (XX03, XX06); (AA06; AA08, AA09); (AW03, AW06, AW07); (MZ02-MZ04, MZ08-MZ10)	

Requirement ID: XX15	Requirement Type: Non-functional - Usability	PUC: Watch Open House/Info Days online
Description: The product should be pleasant to use.		
Rationale: We want people to enjoy using it so that they continue to visit our site.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Seventy percent of a representative test panel returns to our site more frequently than they do to the ten other similar sites available to them.		
Supporting Materials: See usability heuristics for suggested indicators of positive user experience: https://www.nngroup.com/articles/ten-usability-heuristics/	Conflicts: Authentication requirements that may prove unpleasant to the user: (NK01-NK03); (XX01-XX03); (AA01-AA02); (AW01); (MZ01)	

Requirement ID: XX16	Requirement Type: Non-functional - performance	PUC: Watch Open House/Info Days online
Description: The product shall respond to the user's request in 4 seconds.		
Rationale: To avoid interrupting the user's flow of thought. A smooth user experience helps us attract more users		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Given network speed of 150 Mbps, the landing page supporting 10000 users per hour must provide 4 seconds or less response time in a Chrome desktop browser, including the rendering of text and images, over an LTE connection.		
Supporting Materials: Robertson and Robertson(2012) -Mastering the Requirements Process_Getting Requirements Right	Conflicts: Conflicting response times: (AW17); (MZ16); (AA11); (NK11)	

Requirement ID: XX17	Requirement Type: Non-functional - Maintainability	PUC: Watch Open House/Info Days online
Description: The product shall update the Info Days one week.		
Rationale: The Students are able to receive timely updates on all related Info Day information.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Given a school issue a notice on today that they will hold an Info Day. The students should see this Info Day's information update on the app in the next 7 days.		
Supporting Materials: Robertson and Robertson(2012) -Mastering the Requirements Process_Getting Requirements Right	Conflicts: different information recency requirements: (MZ11, MZ17); (NK13)	

Requirement ID: XX18	Requirement Type: non-functional - Cultural	PUC: Watch Open House/Info Days online
Description: The product shall not be offensive to religious or ethnic groups.		
Rationale: The app contains Info Day in different cultural fields and students from all over the world with their own religion. We need to make sure our content does not violate students' beliefs. An inclusive culture helps us attract more users.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The communications department shall give the opinion that the product displays no words or symbols that could be construed as religious or political.		
Supporting Materials: Robertson and Robertson(2012) -Mastering the Requirements Process_Getting Requirements Right	Conflicts: Any free information posting that may be associated with the application in any language: (AW19, AW08-AW10); (XX07-XX10); (MZ07)	

Requirement ID: XX19	Requirement Type: Non-functional - Security	PUC: Watch Open House/Info Days online
Description: The students must change the initially assigned login password immediately after the first successful login.		

Rationale: To prevent the theft of the accounts and protect the student's information security.	
Originator: Kathy Xinxue (System Consultant)	
Fit Criterion: Given the student after the first successful login did not change the initial login password. When he logs out and uses the initial password to log in. Then he cannot log in to the system.	
Supporting Materials: Robertson and Robertson(2012) -Mastering the Requirements Process_Getting Requirements Right	Conflicts: Differing login requirements: (NK02); (AA01); (MZ01)

Requirement ID: XX20	Requirement Type: Non-functional - Privacy	PUC: Watch Open House/Info Days online
Description: The product shall make students aware of its information practices before collecting data from them.		
Rationale: To avoid students sue us for using their information without permission.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Given the student first time creates the account to log in to the system. When he does not click consent to allow the app collecting his data. Then he will not allow login to the system.		
Supporting Materials: Robertson and Robertson(2012) -Mastering the Requirements Process_Getting Requirements Right	Conflicts: Security features potentially compromised by Open Data: (NK 14); (XX19); (AA15); (AW11); (MZ18)	

Requirement ID: AA11	Requirement Type: Performance (12a) – Speed and latency requirements	PUC: Indent Request for New Course
Description: The response time for the system to display search results shall be less than 2 seconds.		
Rationale: Slow response times lose the user's attention; a slight delay is acceptable as long as it does not interrupt a user's flow of thought.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: The system shall respond in less than 2 second for 90 percent of conducted searches; no searches shall take longer than 4 seconds.		
Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA15, AA16); other conflicting speed quirements: (XX16); (MZ16); (NK11)	

Requirement ID: AA12	Requirement Type: Performance (12f) - Capacity	PUC: Indent Request for New Course
Description: The system shall prepare for a specific volume of users during peak usage season.		
Rationale: Expect high levels of traffic in regards to education and job searches during this period of time and ensure that the product is capable of processing the expected volumes.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: The landing page shall support 5 thousand users per hour from March to August.		
Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA15, AA16); other performance requirements: (NK11, NK12); reliability requirements: (NK13); (XX17, XX20); (MZ11)	

Requirement ID: AA13	Requirement Type: Performance (12d) – reliability	PUC: Indent Request for New Course
Description: The system shall set a standard for critical failures under normal usage conditions.		
Rationale: Necessary to anticipate probability on how likely the system or its element would run without a failure under predefined conditions.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: The system shall have no more than 3 reported critical failures in a week under normal usage conditions.		
Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA15, AA16; and requirements that suggest other failure specifications: (AW16); (JK07)	

Requirement ID: AA14	Requirement Type: Look and Feel (10b) - Style	PUC: Indent Request for New Course
Description: The application should be enticing for the user.		
Rationale: Appearance and style of the interface will generate success given the influence of aesthetic appeal to user expectations.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: After their first encounter of the interface, 90% of first time users shall agree they feel they can trust the product.		
Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA17, AA16, AA11, AA12, AA13, AA20); and requirements that prioritize ease of use: (NK15); (XX11, X13, XX15); (MZ12-MZ15)	

Requirement ID: AA15	Requirement Type: Security (15c) - Privacy	PUC: Indent Request for New Course
Description: The system shall encrypt files and store them in the app's private file area and delete them when the app is uninstalled.		
Rationale: Personal content should not be easily accessible to unauthorized users.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: The system shall protect private information and delete user information within 10 seconds when app is uninstalled.		
Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA11, AA12, AA13, AA20); (AW11); (NK14); (XX19); (MZ18)	

Requirement ID: AA16	Requirement Type: Security (15a) - Access	PUC: Indent Request for New Course
Description: The payment processing gateway shall comply to established security standards.		
Rationale: As purchases are being made to deliver courses, the system must be compliant with security standards and/or regulations to ensure client trust.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: The payment processing gateway shall comply with the Payment Card Industry Data Security Standard.		

Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA11, AA12, AA13, AA20); (AW7, AW11)
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Requirement ID: AA17	Requirement Type: Maintainability (14c) – Adaptability	PUC: Indent Request for New Course
Description: The application shall operate on popular operating systems.		
Rationale: Exposing the application to popular platforms and operating systems promotes its use therefore expands to new potential users.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: The application shall operate on iOS and Android platforms.		
Supporting Materials: Indent Request for New Course	Conflicts: All Performance requirements; RequirementID(s): (AA15, AA16), (XX12), (AW12),	

Requirement ID: AA18	Requirement Type: Usability (11a) – Ease of Use	PUC: Indent Request for New Course
Description: Creating an account shall be easy to do for people with little proficiency with technology.		
Rationale: Making account creation an easy process so users are not frustrated and deterred to make an account.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: After a month's use of the product, it shall result in a total error rate of less than 1 percent.		
Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA17)	

Requirement ID: AA19	Requirement Type: Legal (17b) – Standards	PUC: Indent Request for New Course
Description: The product shall comply with the iPhone Human Interface guidelines and Android User Interface Guidelines.		
Rationale: Complying with standards helps avoid delays by adhering to existing system quality recommendations have been made before.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: System shall check with the iPhone Human Interface guidelines and Android User Interface Guidelines to certify that the standard has been adhered to.		
Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA11, AA12, AA13, AA20)	

Requirement ID: AA20	Requirement Type: Performance (12g) – Scalability	PUC: Indent Request for New Course
Description: The system shall be capable of expanding its capacity as the business is expected to grow.		
Rationale: To contend with increasing volumes of user accounts, it is salient to consider capacity for future growth.		
Originator: Asif Ayenun, SkillNET		
Fit Criterion: The app shall be capable of registering and managing 8000 different user accounts. This number is expected to grow to 500,000 total users within two years.		

Supporting Materials: Indent Request for New Course	Conflicts: RequirementID(s): (AA15, AA16); (NK18); (AW14)
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Requirement ID: AW11	Requirement Type: Security	PUC: AW1
Description: The system's data must be stored in a tier 3 data centre that meets ISO270001 and ISO22301 data centre standards.		
Rationale: The user's data must be secure at all times.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The user's data is private and secure in a data centre that is maintained in a way that meets the ISO2700 standard.		
Supporting Materials: ISO27001 and ISO 22301.	Conflicts: All data access functions that may be hindered by security features: (NK4, NK5, NK8); (XX2, XX3, XX8-10); (AA3, AA4, AA7, AA9); (AW4, AW7, AW8-10); (MZ2, MZ6, MZ7, MZ8-10)	

Requirement ID: AW12	Requirement Type: Accessibility	PUC: AW1
Description: The system must be accessible to anyone who has access to the internet on any standard device (PC, Mac, Blackberry, Android).		
Rationale: The app should be available to users who own any major device.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The app is installed and functional on a PC, Mac, Blackberry, and Android.		
Supporting Materials: N/A	Conflicts: (AW11); (AA17); (XX12); (MZ20)	

Requirement ID: AW13	Requirement Type: Storage	PUC: AW1
Description: The system requires 1 petabyte of data storage space.		
Rationale: The initial launch requires enough storage to contain the data of all initial users.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The application is able to store 1 petabyte worth of information.		
Supporting Materials: N/A	Conflicts: All differing scalability and capacity requirements: (AW14); (NK17, NK18); (AA12, AA20);	

Requirement ID: AW14	Requirement Type: Scalability	PUC: Create Premium Institutional Profile
Description: The system's data capacity should accommodate increases or decreases in scale.		
Rationale: The application's data requirements may exceed expectation or require far less space than initially required. Additionally, the data storage requirements will increase over time.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The system's storage may be reduced or increased as needed.		

Supporting Materials: N/A	Conflicts: All differing scalability and capacity requirements: (AW13); (NK17, NK18); (AA12, AA20);
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Requirement ID: AW15	Requirement Type: Interoperability	PUC: Create Premium Institutional Profile
Description: The system will be able to connect with Facebook, LinkedIn, and Academia.edu.		
Rationale: This will reduce the number of logins that a user must complete and allow users to connect their account to Facebook, LinkedIn, or Academia.edu profiles.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Users will be able to connect their Skillnet profiles to Facebook or LinkedIn.		
Supporting Materials: N/A	Conflicts: All data security requirements: (NK14); (XX19); (AA15); (AA16); (AW11); (MZ18)	

Requirement ID: AW16	Requirement Type: Maintainability	PUC: Create Premium Institutional Profile
Description: Any critical issues should be rectified in under 24 hours.		
Rationale: If there are issues with the app, they need to be rectified as soon as feasibly possible to ensure no misinformation.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The company in charge of maintenance is able to respond to issues and correct them within 48 hours.		
Supporting Materials: N/A	Conflicts: Any requirements that propose other guidelines for system failure: (AA13); (JR01)	

Requirement ID: AW17	Requirement Type: Performance	PUC: Create Premium Institutional Profile
Description: The system shall perform queries in under 2 seconds.		
Rationale: The system requires quick response times but not necessarily instantaneous.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: All types of queries process in less than 2 seconds.		
Supporting Materials: N/A	Conflicts: Other suggested system response times: (AA11); (XX16); (MZ16); (NK11)	

Requirement ID: AW19	Requirement Type: Accessibility/Cultural	PUC: Create Premium Institutional Profile
Description: The system must be able to translate contents into French, English, and Mandarin.		
Rationale: Users with various language skills will want to engage with this application.		
Originator: System Administration		
Fit Criterion: The application will be available in readable French, English, and Mandarin.		

Supporting Materials: Based on the top 3 languages spoken in Canada: https://www.clo-ocol.gc.ca/en/newsletter/2018/top-5-languages-spoken-canada .	Conflicts: Other cultural requirements that do not align or require additional support to accommodate: (NK16); (XX18)
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Requirement ID: AW20	Requirement Type: Responsiveness	PUC: Create Premium Institutional Profile
Description: The system should return to the application interface exactly where the user was before being interrupted by phone calls or other alerts on their device.		
Rationale: Using the application should be a seamless experience that is not interrupted by external programs in the device. Interruptions should not cause users to reenter information, reducing user experience. Many of the fields require additional data and interruptions are expected.		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: When the application is interrupted, the user will be able to return to the current function within the application without losing data.		
Supporting Materials: Adapted from https://www.guru99.com/non-functional-requirement-type-example.html	Conflicts: Possible security issues following a lack of verification: (NK14); (XX19); (AA15, AA16); (AW11); (MZ18)	

Requirement ID: MZ11	Requirement Type: compatibility	PUC: Budgetary Concern
Description: The product shall be able to handle large volume of data		
Rationale: The system won't over crash to affect the users use the app		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The system should operate in the similar speed with less or equal 20 million user use the at the same time		
Supporting Materials: N/A	Conflicts: other failure handling requirements: (AA13); (AW16)	

Requirement ID: MZ12	Requirement Type: Usability	PUC: Budgetary Concern
Description: The interface of the app should be user friendly		
Rationale: Increase the retention rate of the users		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The feedback of the survey from the user about the likeness of the app should never lower than 4/5		
Supporting Materials: Aesthetic and minimalist design usability heuristic according to Jakob Nielson: https://www.nngroup.com/articles/ten-usability-heuristics/	Conflicts: Advanced features requiring additional interface elements that reduce aesthetic and minimalist design heuristic: (NK4-NK7); (XX8-XX10); (AA6-AA9); (AW2-AW10); (MZ2, MZ3, MZ8-MZ10)	

Requirement ID: MZ13	Requirement Type: Usability	PUC: Budgetary Concern
Description: The product should be easy to access		
Rationale: Users will not have difficulty to access the app and increase the retention rate		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Tracking the active user of the app at all time, the number of active user should not have significant drop		
Supporting Materials: None	Conflicts: Device restrictions: (XX12); (AA17); AW12); (MZ20).	

Requirement ID: MZ14	Requirement Type: Usability	PUC: Budgetary Concern
Description: The product shall have clean and simple interface		
Rationale: Won't cause any confusion for the user so they won't stop using the app		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Sending survey to users to find out do they think there are too much information on each interface		
Supporting Materials: Minimalist design usability heuristic according to Jakob Nielson: https://www.nngroup.com/articles/ten-usability-heuristics/	Conflicts: Advanced features requiring additional UI features, reducing minimalist design: (NK4-NK7); (XX8-XX10); (AA6-AA9); (AW2-AW10); (MZ2, MZ3, MZ8-MZ10)	

Requirement ID: MZ15	Requirement Type: Usability	PUC: Budgetary Concern
Description: The product shall have interface easy to manage for the user		
Rationale: Easy for the users to use the app, users can get the information they want as fast as possible		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: Tracking the amount of time of user spend on each interface, if they spend too much time, conduct a market research to see if they have hard time to use the app		
Supporting Materials: Flexibility and efficiency use usability heuristic according to Jakob Nielson: https://www.nngroup.com/articles/ten-usability-heuristics/	Conflicts: Advanced features requiring additional usability skills, reducing flexibility: (NK4-NK7); (XX8-XX10); (AA6-AA9); (AW2-AW10); (MZ2, MZ3, MZ8-MZ10)	

Requirement ID: MZ16	Requirement Type: Performance	PUC: Budgetary Concern
Description: The product shall return search result less than 0.5 second		
Rationale: Users won't waste too much time waiting for the result to return		
Originator: User		
Fit Criterion: The speed of the return of search result should less or equal than 0.5 second		
Supporting Materials: None	Conflicts: Other suggested response times: (XX16); (AW17); (AA11); (NK11)	

Requirement ID: MZ17	Requirement Type: Maintainability	PUC: Budgetary Concern
Description: The product shall not have too much change with each update		
Rationale: Users won't spend too much to relearn the feature of the app		

Originator: Kathy Xinxue (System Consultant)	
Fit Criterion: Each update should change or add less than or equal to 3 features	
Supporting Materials: Consistency and Standards usability heuristic according to Jakob Nielsen: https://www.nngroup.com/articles/ten-usability-heuristics/	Conflicts: Updates require that the application is not functional 99.9% of the time (JK01)

Requirement ID: MZ18	Requirement Type: Security	PUC: Budgetary Concern
Description: The product shall protect the data of every user		
Rationale: Any data leakage will not happen, protect the reputation of the app		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The data of the user can only storage in the system, only the company have the data, should not appear in anywhere else		
Supporting Materials: ISO27001 and ISO 22301 data standards	Conflicts: Different Security requirements (NK14); (XX19); (AA15, AA16); (AW11)	

Requirement ID: MZ19	Requirement Type: Localization	PUC: Budgetary Concern
Description: The product shall return result based on the location of the user		
Rationale: Users can learn what are the options they have in the locations near them		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: The location of the search result should less than or equal to 10km within the users' location		
Supporting Materials: https://www.mobilemarketer.com/ex/mobilemarketer/cms/news/search/3994.html	Conflicts: All security requirements since location sharing is a potential security risk: (NK14); (XX19); (AA15); (AW11); (MZ18)	

Requirement ID: MZ20	Requirement Type: Availability	PUC: Budgetary Concern
Description: The product shall be able to be downloaded and used for every smartphone system		
Rationale: Everyone can use the app, increase the volume of the user		
Originator: Kathy Xinxue (System Consultant)		
Fit Criterion: New user should be able to download and use the app in every smartphone		
Supporting Materials: https://www.digitaldoughnut.com/articles/2017/april/5-advantages-of-cross-platform-mob-app-development	Conflicts: All differing device requirements: (XX12); (AA17); (AW12); (MZ20)	

10 ARCHITECTURAL DESIGN

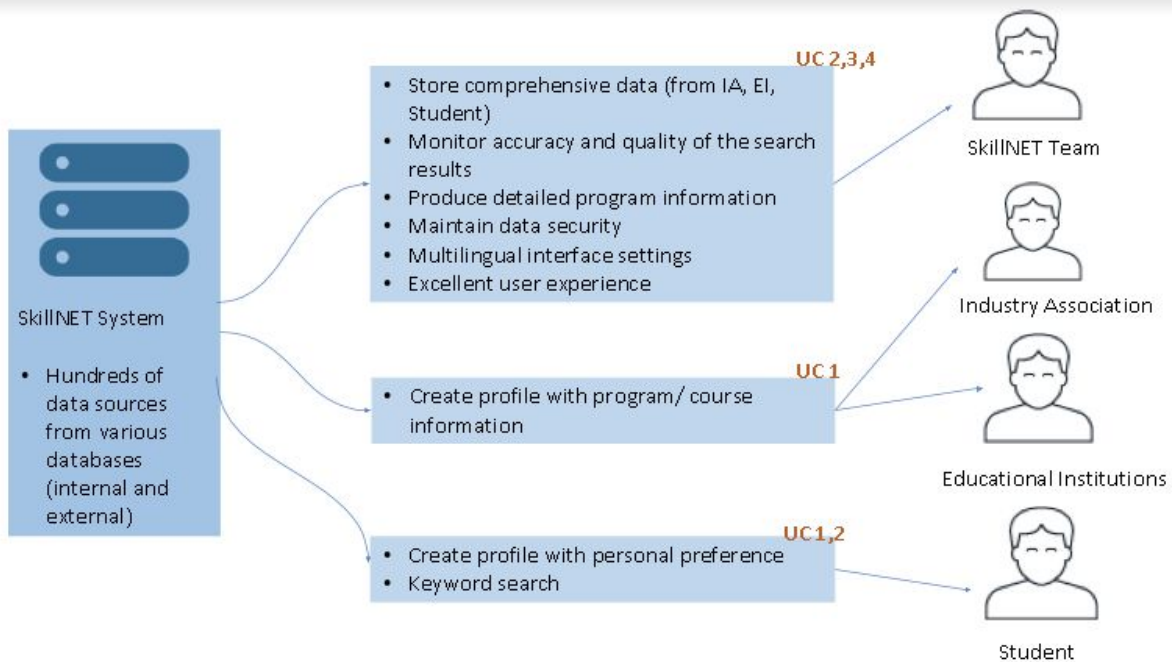
10.1 KEY DRIVERS AND ARCHITECTURALLY SIGNIFICANT REQUIREMENTS

Our three Key drivers are based on our Use Cases and are as follows:

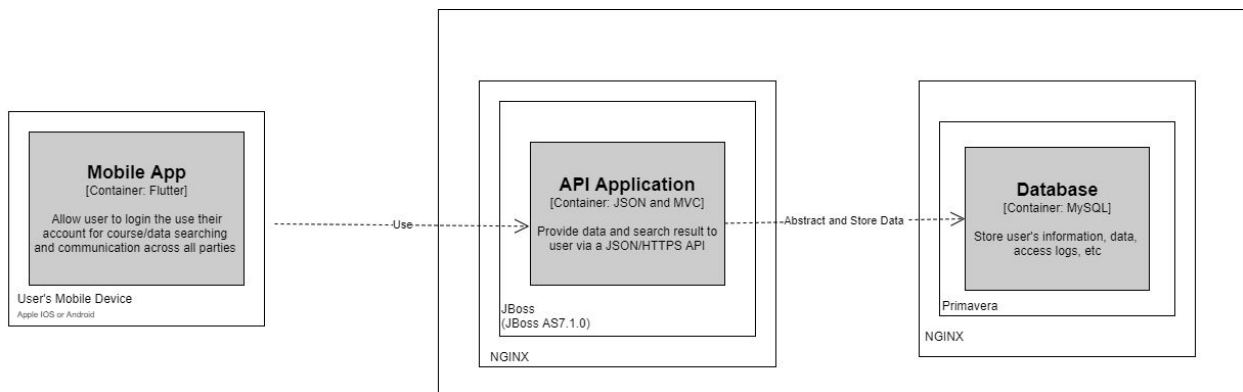
Data Storage: The ability to store comprehensive data that is searchable and usable.

Search Tools: The ability to search information stored with the correct security access.

Profile Creation: The ability for student user’s and educational institutions/industry associations to create a unique profile that will save their personal preferences and search history.



The development view for these Key Drivers



The list of architecturally significant requirements (ASRs) following a functional analysis:

ASR1 (NK01): Profile creation - App should allow for profiles to be created easily by all users: Students, Educational Institutions (EI) and Industry Associations (IA).

ASR2 (AW01): Authentication - The application shall request the student or institution to login and authenticate username and password based on their profile type.

ASR3 (AA15): Security – All users (students, EI, IA) profile information shall be secure and remain confidential and encrypted. (Key Quality Scenario 2)

ASR4 (NK03): The application shall request the student to input a career choice or skill set.

ASR5 (MZ02): Career program data is searchable by Industry Association, Educational Institution, and or skill set.

ASR6 (AA13): Application stability. the system must handle a large volume of users that search and input information at the same time (as well program data inputted by EI and/or IA at the same time) without crashing or losing functionality.

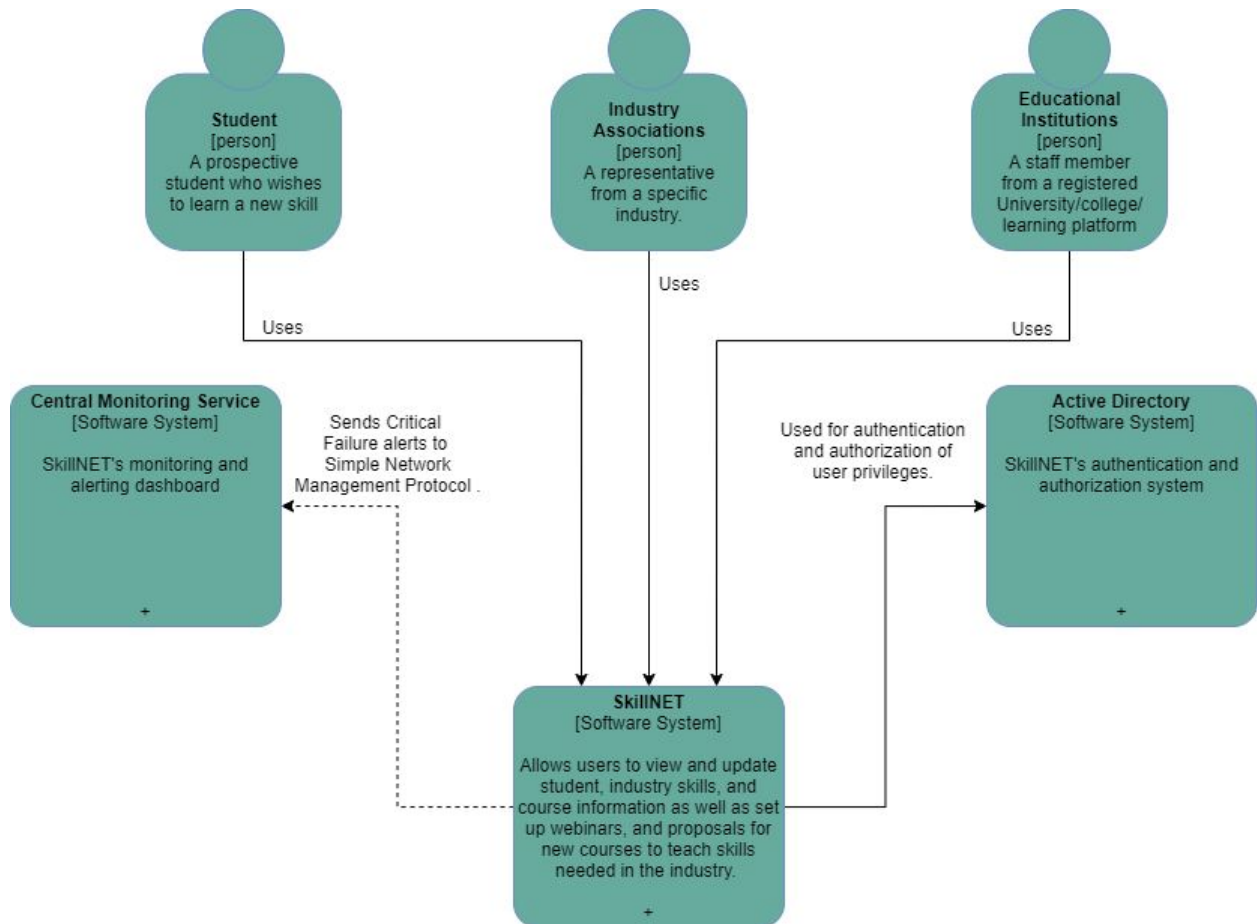
ASR7 (AW17): Performance response time - The applications overall performance will be evaluated measuring the response of the query and report times. (Key Quality Scenario 1)

ASR8 (MZ18): Reliability/Accuracy and quality of data results. Accuracy and the quality of the search results should be monitored, to ensure that the student queries are producing the correct program results.

ASR9 (NK16): Cultural - The application should be available in several languages for the foreign students.

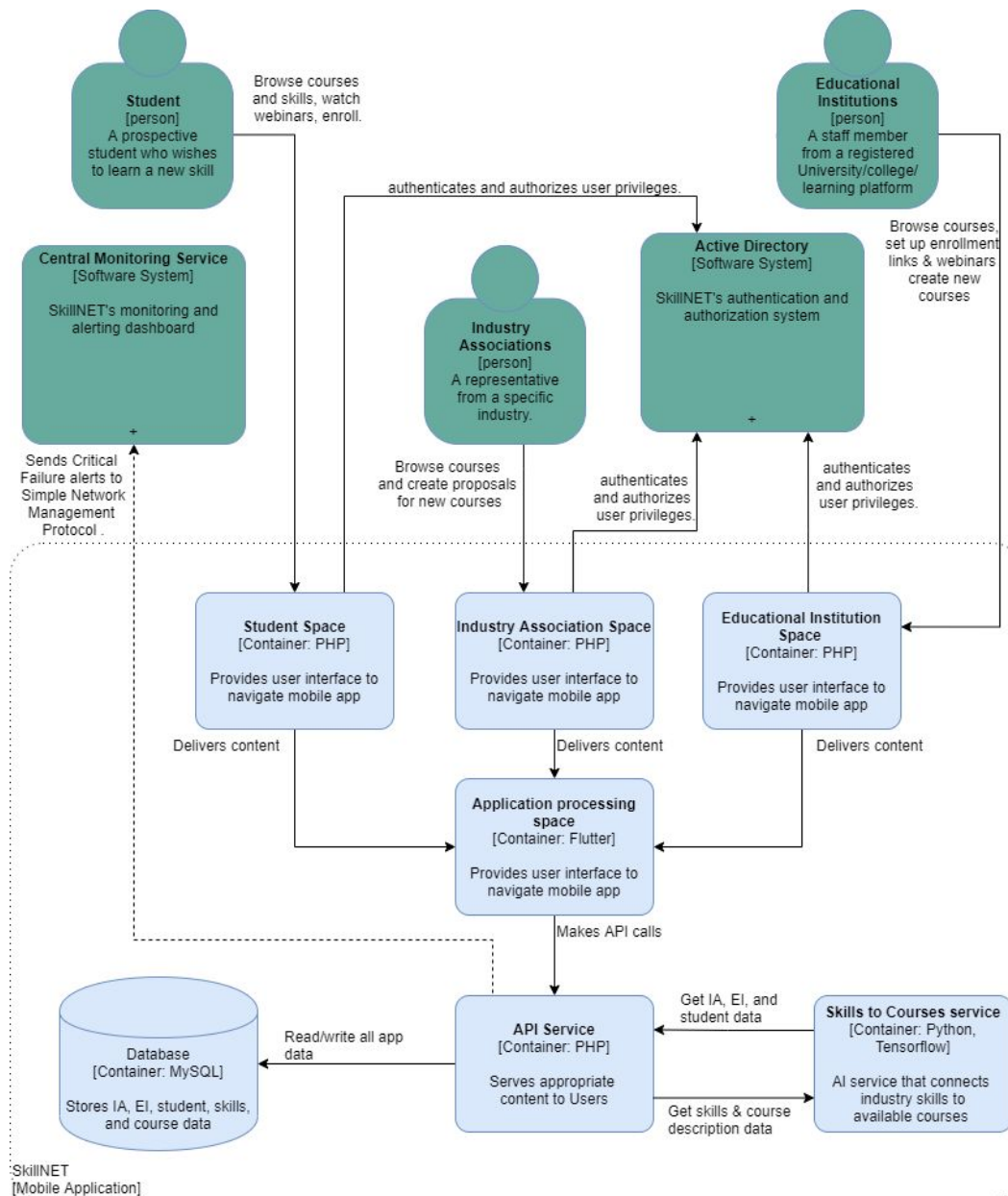
ASR10 (NK05): The application produces program results in a report summary. (Key Quality Scenario 3)

10.2 CONTEXT VIEW



Our application stems from the users which are the Students, the industry Associations, and the Educational Institutions. Our application is used, as a complete solution, by each of these independent stakeholders. As an extension of the application's main functions with which users engage, there is a need to proceed with payments made by recruiters and issue invoices with the usage of our ERP system. Our application is also using an authentication system and a system for crash reports. With the context diagram, we are able to easily see which system we are working with and the key users.

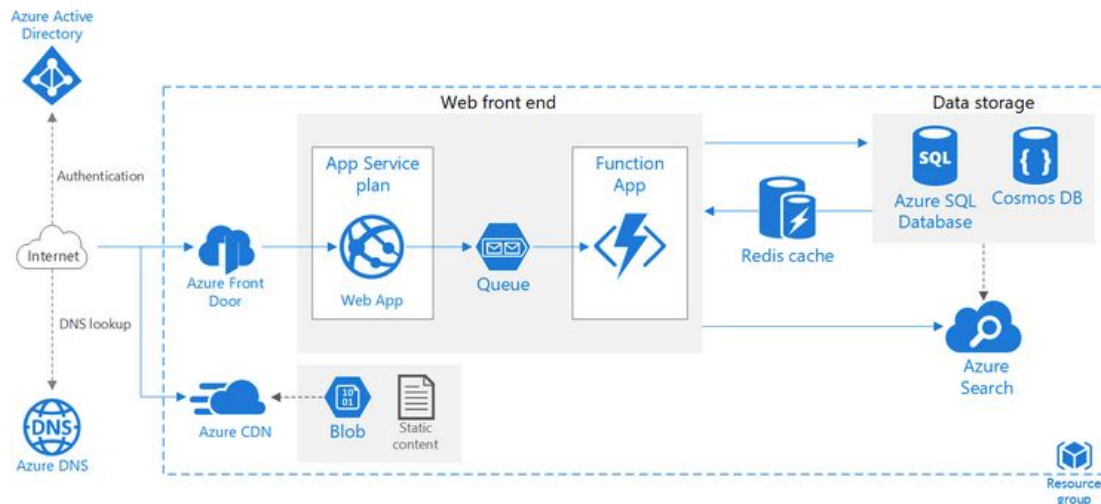
10.4 CONTAINER VIEW



In our container view,, we demonstrate how SkillNET communicates with others with APIs which are not directly dependent. On this level, we are also interested in protocols that each container uses to communicate and the technology it uses. The furthest we examine in the container view is how we rely on JSON to send and request Representational State Transfer API when searching with our mobile app and identify the GET requests required to get a list of repositories from the specific user. We do not explore how classes or functions are working together and leave that for lower level specifics.

10.5 KEY ARCHITECTURAL DESIGN DECISIONS

Our system architecture, the Azure Web Application, was selected on the third iteration based on how the infrastructure met our selected ASRs. The Azure Web Application, a Microsoft Reference Architecture and App development platform, could be purchased off of the shelf and used to design an application that meets our needs.²



Key Drivers and the Architecture:

Profile Creation is made secure with the **Azure Front Door** before entering the **Web App** (the main API with which users will engage) and acts as an additional security measure.

Search Tools drivers are met through the **Function App** (a serverless compute option that allows requests to be sent to the API gateway) that connects with **Azure Search**. Additionally, the **Blob** through the **Azure CDN** and the **Redis Cache** gather semi-static transaction data on how the users are looking up information in our application, allowing us to better customize and develop this application over time without infringing directly on the users privacy. Additionally the **Azure CDN** reduces latency, assisting our speed time requirements (AA11); (XX16); (MZ16); (NK11); (AW17).

Data Storage is met through the **Azure SQL Database** and **Cosmos DB**, which are each able to hold multiple databases in the same logical server, allowing us to store data for Institutional Profiles (PUC3, 4) while also meeting the needs of other users (PUC1, 2, 5). In addition to meeting our functional drivers, each of our ASRs are met by the features offered by this system:

- Configuration Management (ASR1; ASR9).
- Data Access and Front Door Authentication (ASR4; ASR5).
- Data Logging (ASR8; ASR10).
- User Friendly Interface (ASR9).
- User Authentication (ASR2; ASR3).
- Data Caching (ASR6; ASR7).

The only cons to this architecture are that it is expensive to create an Azure Web Application and if it was purchased off of the shelf, the ownership of the information is managed by Microsoft and not locally potentially conflicting with ASR6 which requires that the application is always operational. However, it is simply a robust solution that will meet the SkillNET needs.

² Diagram from and more in depth description at "Improve Scalability in an Azure Web Application," docs.microsoft.com, October 3, 2019, <https://docs.microsoft.com/en-us/azure/architecture/reference-architectures/app-service-web-app/scalable-web-app>.

11 OPEN ISSUES

The application is mostly a data repository and so many of our functional requirements conflict with the non-functional requirements because we want a simple system that is easy to use and secure but ease of use and advanced search features directly conflict. Possible future solutions would be to have a free software with simple search options and then a more advanced profile that users could pay a one time fee or a subscription to partition our need for complexity with our need for simplicity.

13 Changes made in the course of analysis

During the course of analysis, changes were made to make the application's design and architecture allowing SkillNET to become more competitive. The changes involved increased security, queries input, foreign languages and compatibility for all platforms. We also changed to differentiate ourselves from simply job seeking sites and agencies by focusing on the skills that industry desires and connecting them to available learning platforms (traditional schools and universities or online learning platforms) so as to direct students towards their learning path to enter a field.