Technical Temporary employees Inc.

TTI Management System

Analysis and Elaboration Report

Prepared For: Mr. Mortimer Jones
Technical Temporary employees Inc. (TTI)

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Submission Date: 18 April 2020

Work Load Participation Index Form

for

Assignments & Project(s)

(To be Submitted/Attached with Every Assignment and Phases of Project)

(Date of Submission): April 18nd 2020

Artifact/Document Type (e.g. Exam/Assignment #1/#2/#3, Project Phase 1/2): Final Project Participation in his/her allocated task's completion

5= Full (as allocated) 4= Partial (slightly less) 3=Half (as allocated) 2/1=Little 0= No Participation

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Due to the current social distancing problem, we cannot get everyone's signature. All participation proof can be obtained from group leader.

*The **Project Leader** for this Group is: Thang Nguyen*

Signatures of Team/Project Leader: Thang Nguyen
Team Number/Name (if any) _____

***Note:** Team leader please briefly describe below if any group member(s) is/are not participating properly to justify learning and workload participation in the located task(s).*

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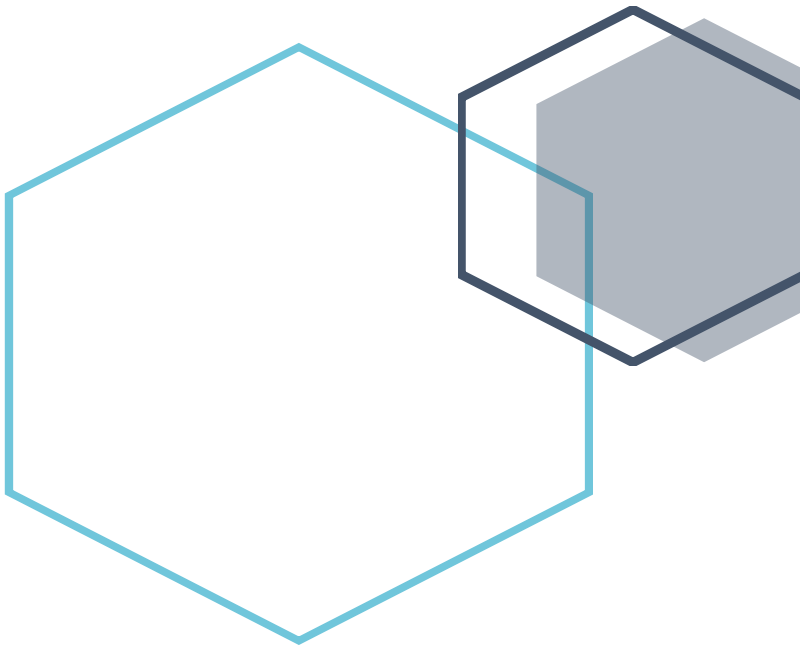
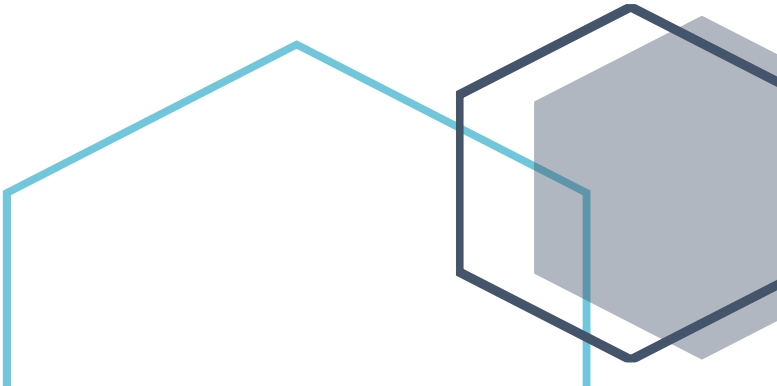


INTRODUCTION

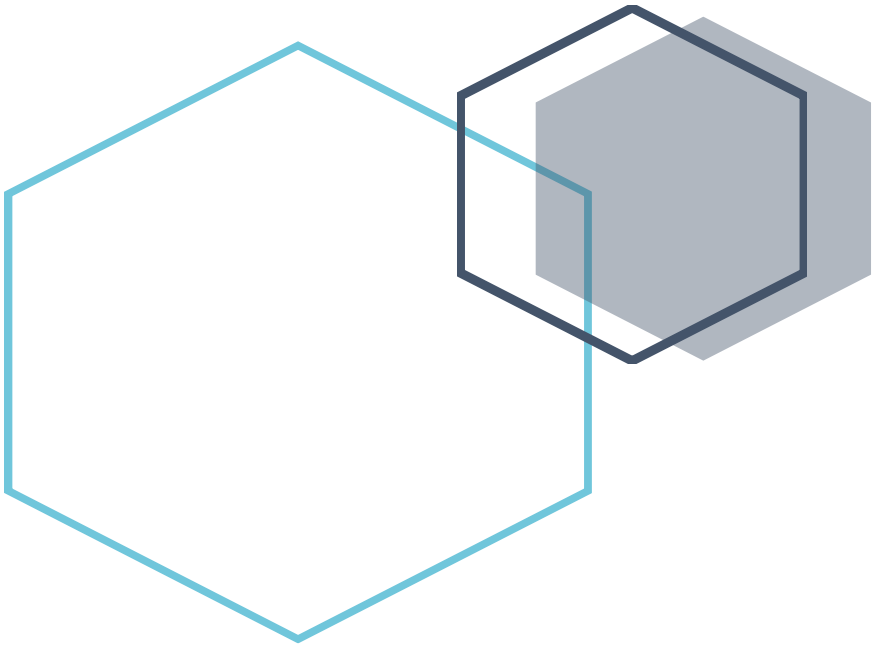
This Elaboration Report outlines our project group's proposal for a system to handle the required features and functions for Technical Temporary employees Inc. Our estimation for the delivery of this system is by August 1st, 2020.



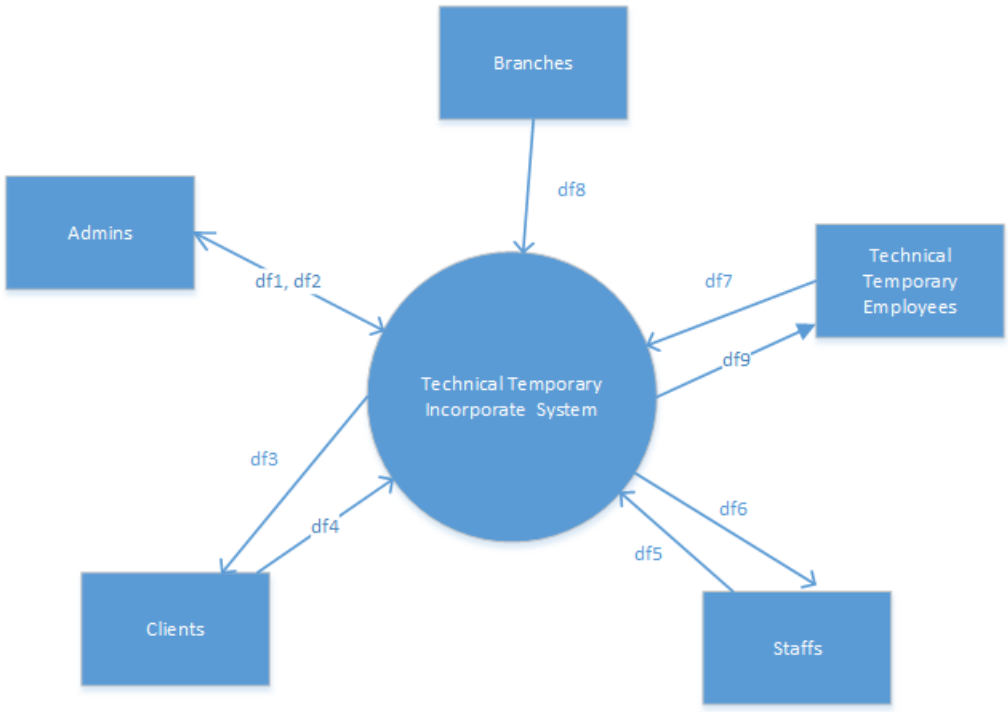
PURPOSE OF PROJECT

Our client, Mr. Mortimer Jones, is looking for a reliable system that can handle temporary employment request matching including record storing and retrieving for TTI staffs and employees that can be served remotely through either smartphones or web browsers. Their primary concern at this point is that they want most of their technical temporary employee information including pay stub information be entered in automatically and electronically in a reliable timely manner. Currently there is not system in place at TTI that can handle such automation, and it is costing TTI a lot of resources to keep track of the records that the staffs and temporary employees have put in. Our team are proposing a Management System that will help TTI staffs and temporary employees allow automated online record input and job match that will lead to faster internal processing and less internal bureaucracy. This system will include an online web interface that will allow administrators to administrate all database transactions and rectify them should there be any errors. All records will be all stored on a database and backed up on daily basis.

Our team have designed and outlined the main activities in this report which will help show the efficiency of the propose management system.



CONTEXT DIAGRAM



Data flows of Context Diagram:

df1 – TTI administrators view/configure the TTI system without any restriction

df2 – TTI system notifies administrators about breaking changes

df3 – TTI system provide technical temporary employee information to the clients

df4 – Clients register for accounts, post jobs, accept employment request from TTI system

df5 – Staffs register for accounts, match job with technical temporary employees, and provide pay stubs to the system.

df6 – TTI notifies staffs about pay stubs and all the breaking changes in the systems

df7 – Technical temporary employees register accounts, provide their information and update job status to the system

df8 – Branches provide information to the TTI system about all the available branches

df9 – TTI system matches job and provide job notifications for technical temporary employees

EVENT TABLE: Fulfilling temporary employment request with technical temporary employees and clients

EVENT	TRIGGER	SOURCE	USE CASE	RESPONSE	DESTINATION
Technical temporary employees register for the system	Signing Up	Technical Temporary employees	Add technical temporary information to the system	New Account for Technical Temporary employees	Our system + technical temporary employees
Technical temporary employees provide certificate, skills, and official documents	Updating skill/qualifications on the systems	Technical Temporary employees	Add additional skills/qualifications for technical temporary employees	Updated information for technical temporary employees	Our system + admins + technical temporary employees + clients
Prospective clients register for the system in the client section	Signing up	Clients	Add client information to the system	New Account for technical temporary clients	Our system + clients
Clients add project/job descriptions for the system	Adding project/job descriptions	Clients	Provide project/job description for technical temporary employees matching	New project/job descriptions	Admins + our system + clients

TTI staffs match technical temporary employees to clients based on skills and qualifications	Matching clients and technical temporary employees	TTI staffs	Match technical temporary employees with the right clients	Match notifications for clients and technical temporary employees	Our system + staffs + technical temporary employees + clients
Clients accept the match	Accept the match	Clients	Clients accept the match	Acceptance pending on technical temporary side	Our system + staffs + technical temporary employees + clients
Technical Temporary employees accept the match	Accept the match	Technical Temporary employees	Technical Temporary employees accept the match	Matched job for both technical temporary employees and clients	Our system + staffs + technical temporary employees + clients + admins

EVENT TABLE: Technical Temporary employees update job/project status

EVENT	TRIGGER	SOURCE	USE CASE	RESPONSE	DESTINATION
Technical temporary employee logins to the system	Login Request	Technical Temporary employees	Technical temporary logins to the system	Successful login request + main home page	Our system + technical temporary
Technical temporary employees update status of job/project	Update status request for a job/project	Technical Temporary employees	Update the status of a project/job	Acceptance request for the client of the job/project	Our system + technical temporary employees + clients + TTI staffs
Client login to the system	Login Request	Clients	Client logins to the system	Successful login request + main home page	Our system + clients
Client accepts the new update status for a job/project	Accept the update status request for a job/project	Clients	Accept update status for a job/project	New update status for job/project	Our system + technical temporary employees + clients
Client rejects the new update status for a job/project	Decline the update status request for a job/ project	Clients	Decline update status request for a job/project	Rejected update request	Our system + technical temporary employees + client
Client accepts the new updates status of job/ project	Update status request for a job/project	Clients	Update the status of a project/job	Success update response	Our system + technical temporary employees + clients + TTI staffs

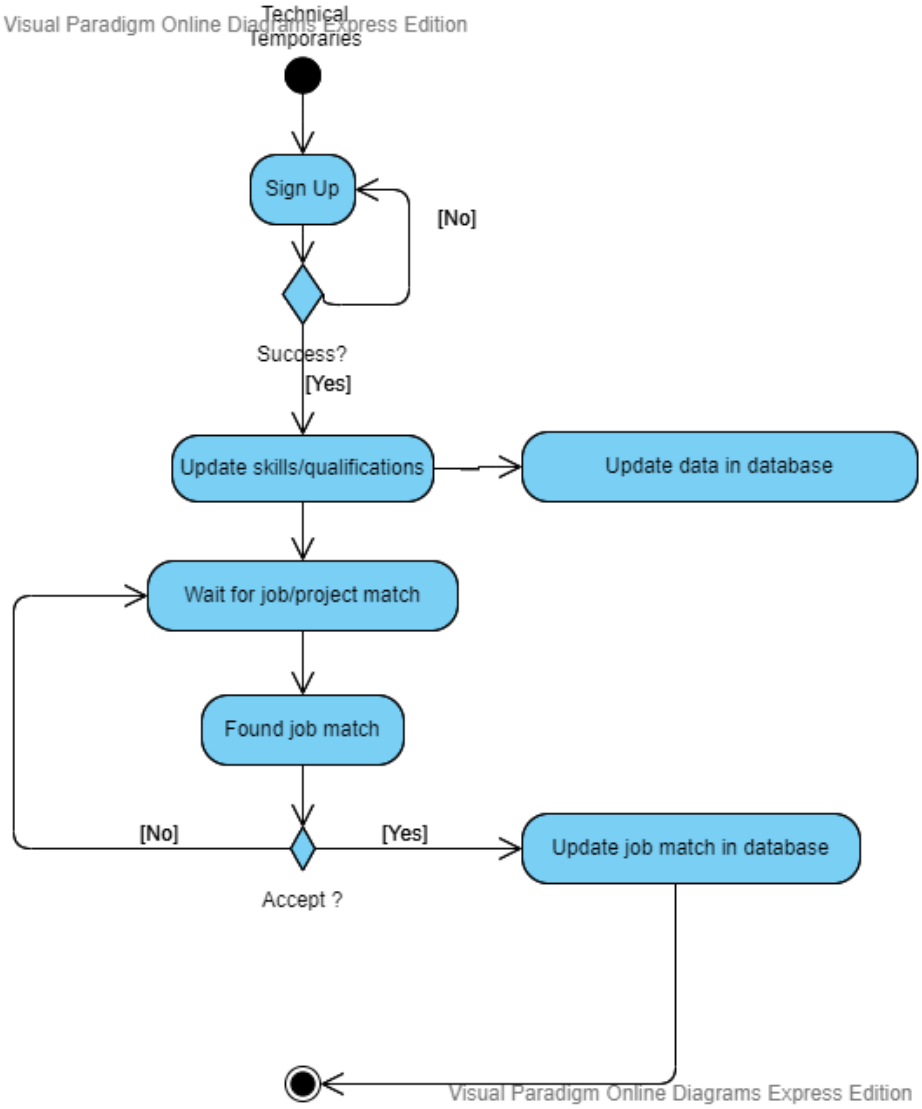
TTI staffs review status update for anomalies	Technical Temporary employees check new update request	Clients	Review update status for each job/project	Verify check for anomalies	Our system + technical temporary employees + clients

EVENT TABLE: TTI staffs issue paystubs to technical temporary employees

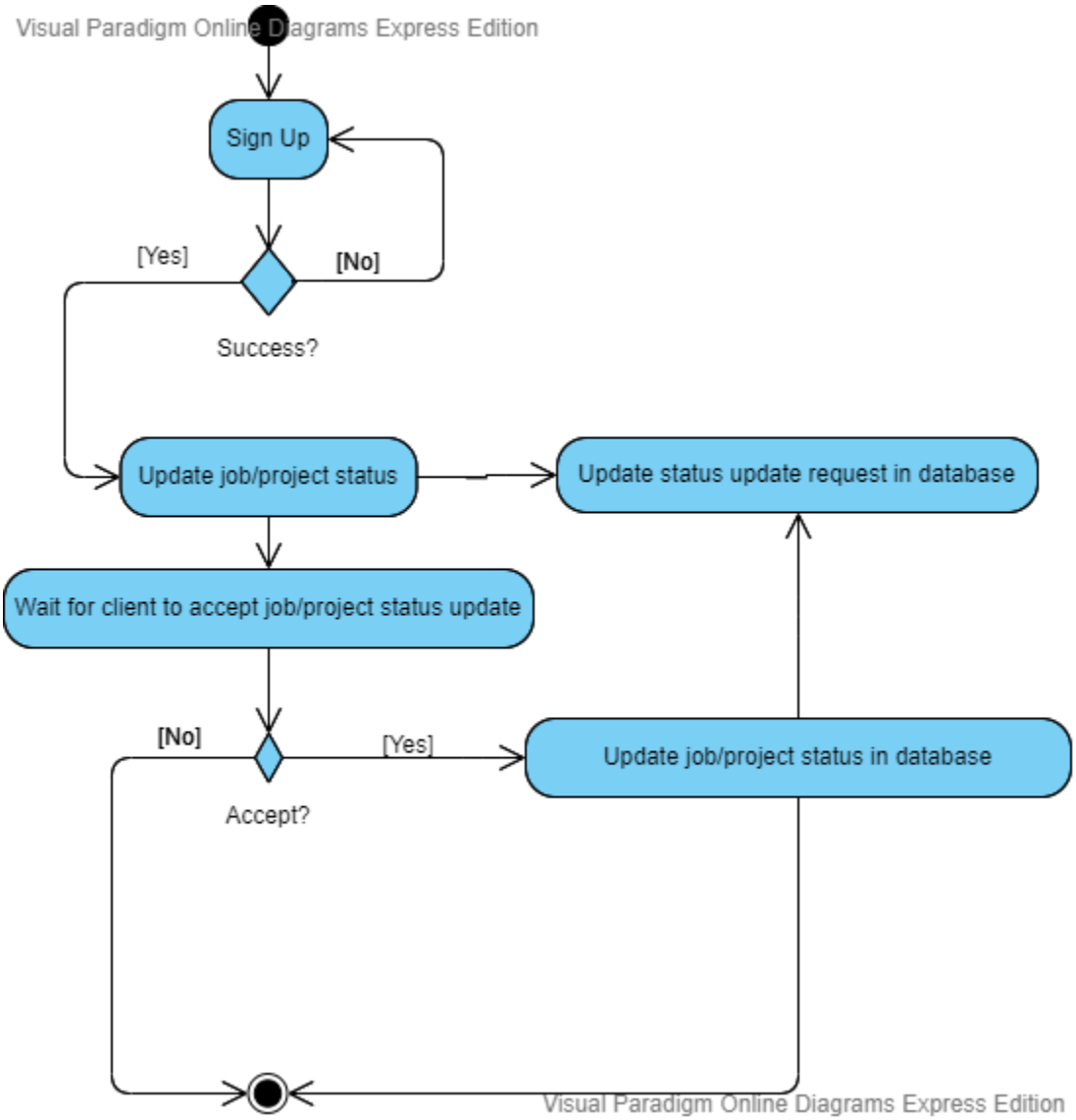
EVENT	TRIGGER	SOURCE	USE CASE	RESPONSE	DESTINATION
2-week pay stub period notification sent to TTI staffs	2-week period system notification	TTI system	Remind TTI staffs to issue pay stubs to technical temporary employees	Notifications + Email notifications sent to technical temporary staffs	Our system + TTI staffs
TTI staff logins to system	TTI staff login request	TTI staffs	Login to the system	Successful login request	Our system + TTI staffs
TTI staff view and verify all the hours logged by the Technical Temporary employees	Viewing the hours updated by technical temporary employees	TTI staffs	View and verify technical temporary work hours	Work hours verification	TTI staffs
TTI staff issues paystubs electronically	Clicking on the button that generate all the paystubs automatically	TTI staffs	Issue pay stubs to technical temporary employees	Paystub email notifications sent to all technical temporary employees	Our system + technical temporary employees + TTI staffs
Technical Temporary employees login to system	Technical Temporary employees login request	Technical Temporary employees	Login to the system	Successful login request	Our system + technical temporary employees

Technical Temporary employees retrieve paystub information	Technical Temporary employees paystub retrieve request	Technical Temporary employees	Technical Temporary employees retrieve paystubs	Paystub information	Our system + technical temporary employees

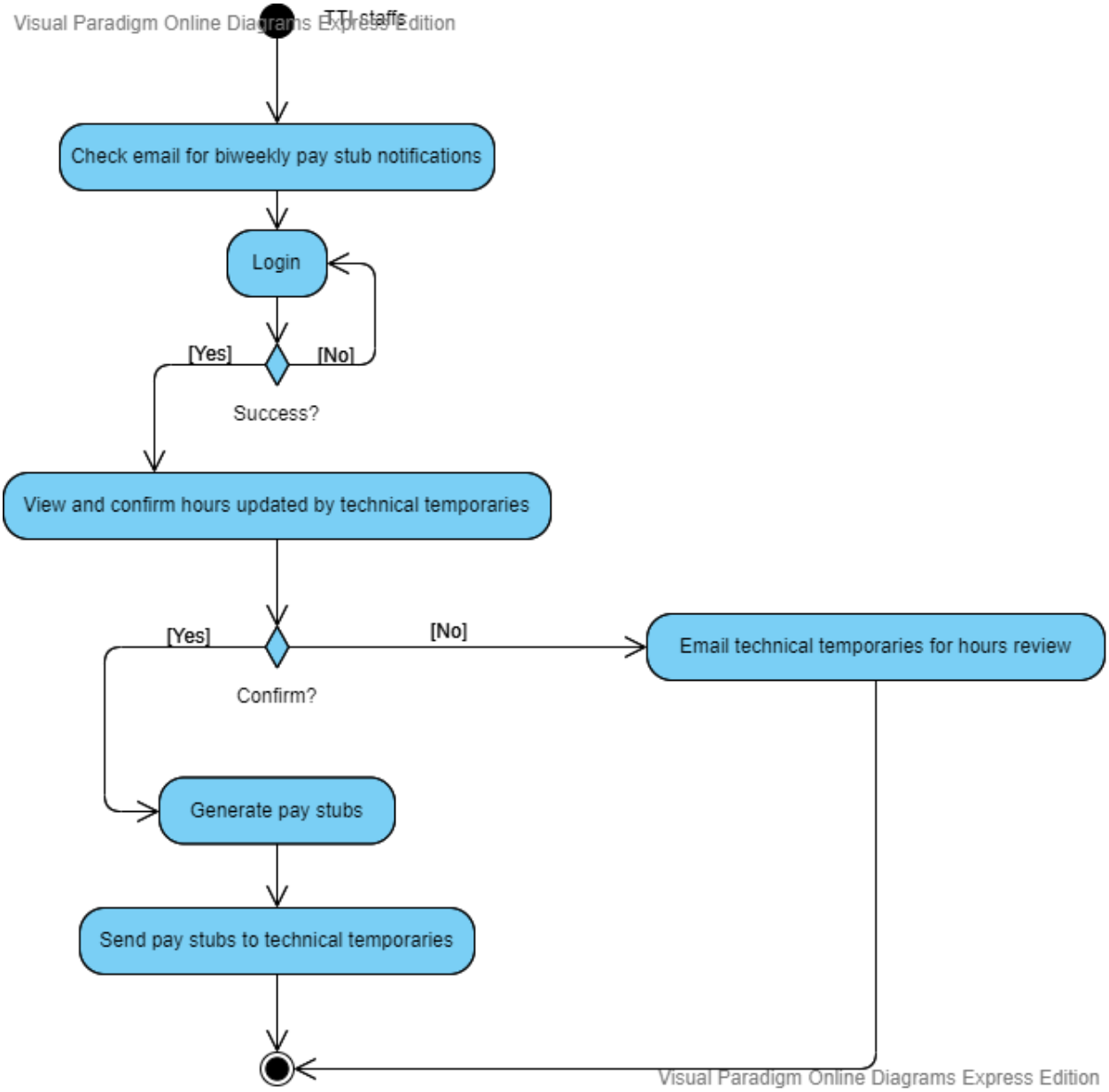
ACTIVITY DIAGRAM: Fulfilling temporary employment request with technical temporary employees and clients



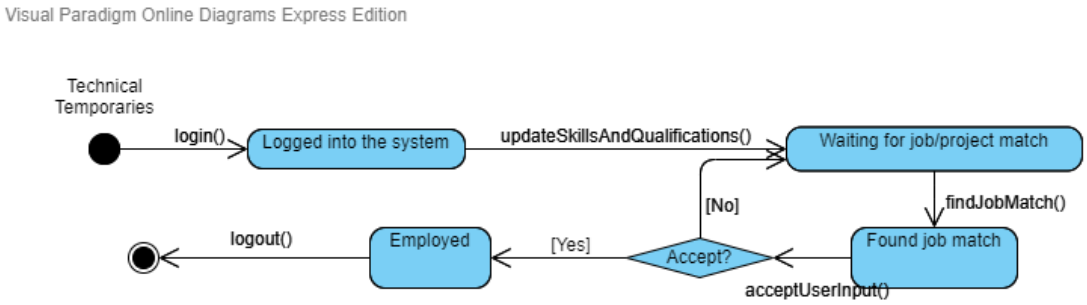
ACTIVITY DIAGRAM: Technical Temporary employees update job/project status



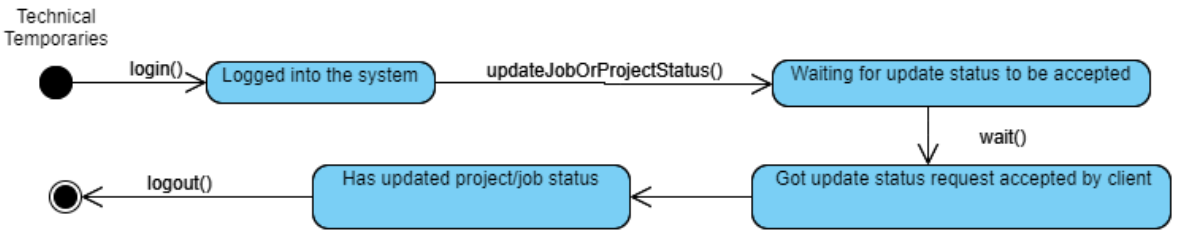
ACTIVITY DIAGRAM: TTI staffs issue paystubs to technical temporary employees



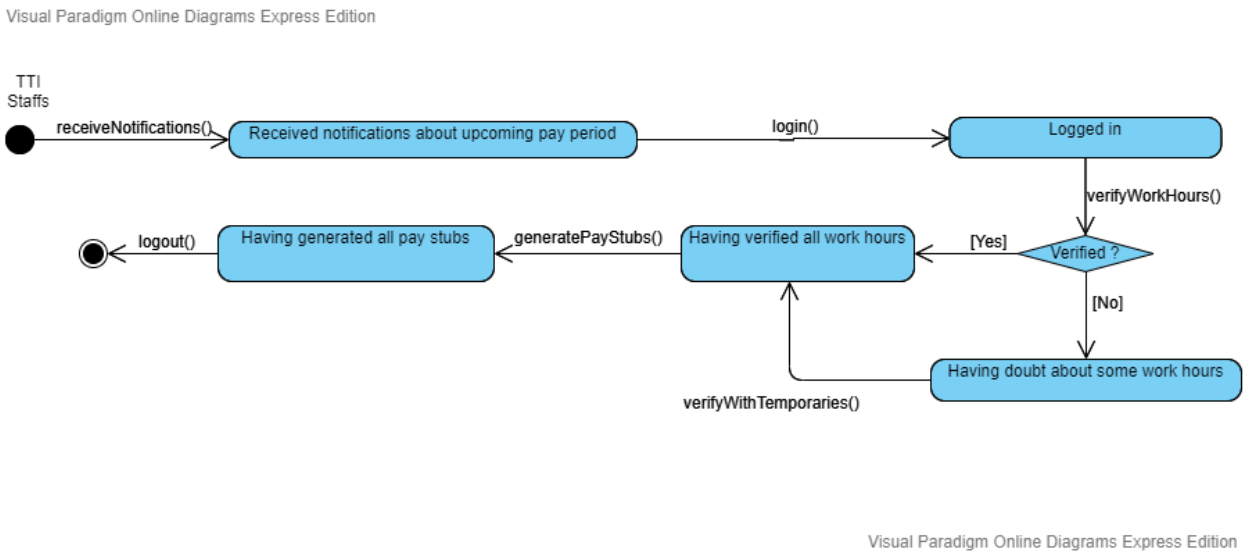
STATE CHART DIAGRAM: Fulfilling temporary employment request with technical temporary employees and clients



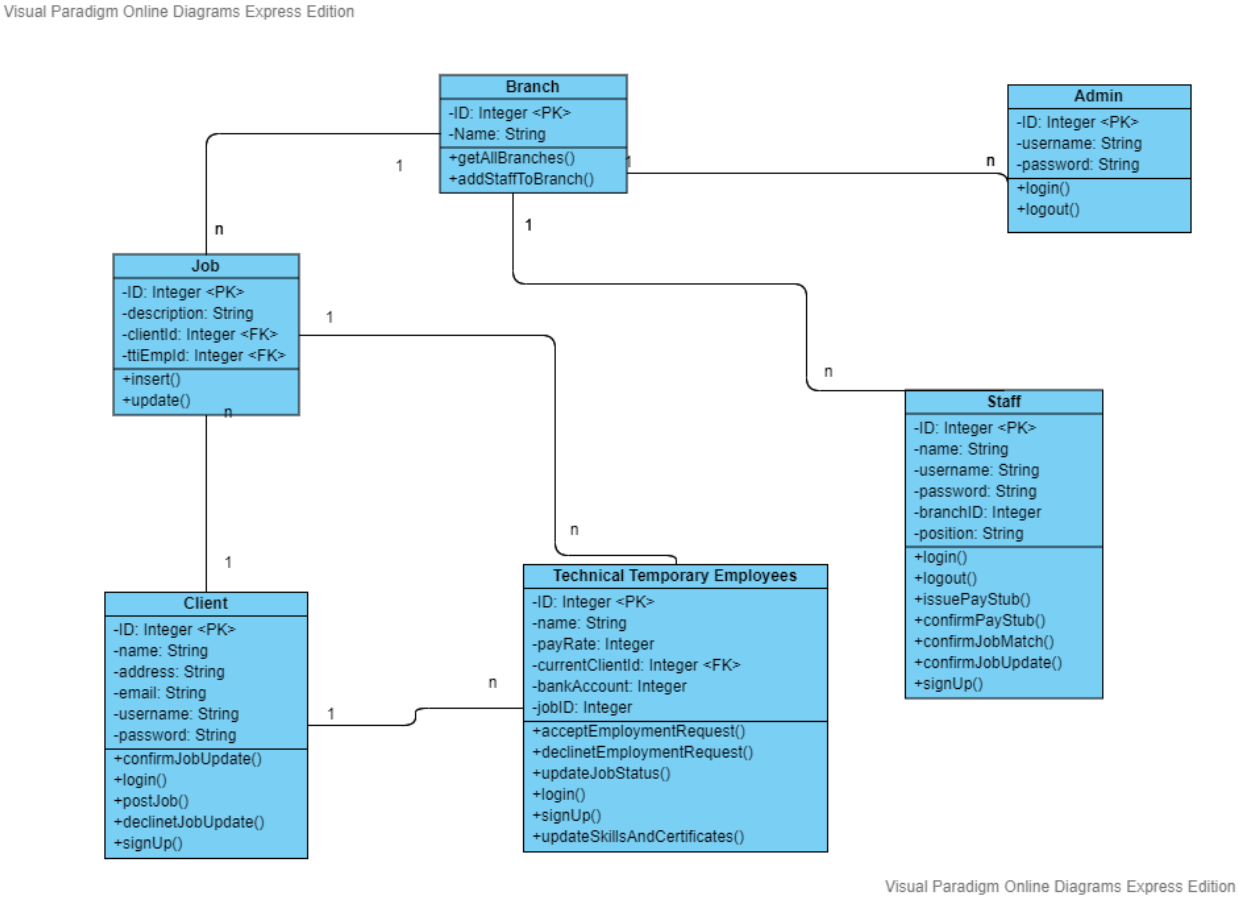
STATE CHART DIAGRAM: Technical Temporary employees update job/project status



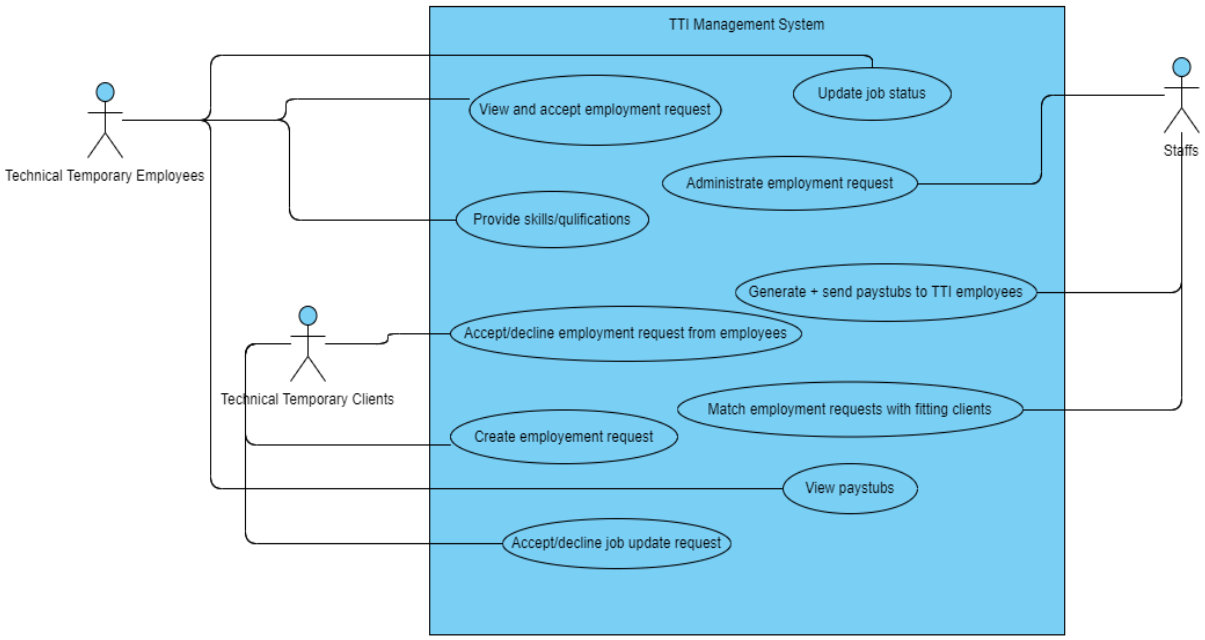
STATE CHART DIAGRAM: TTI staffs issue paystubs to technical temporary employees



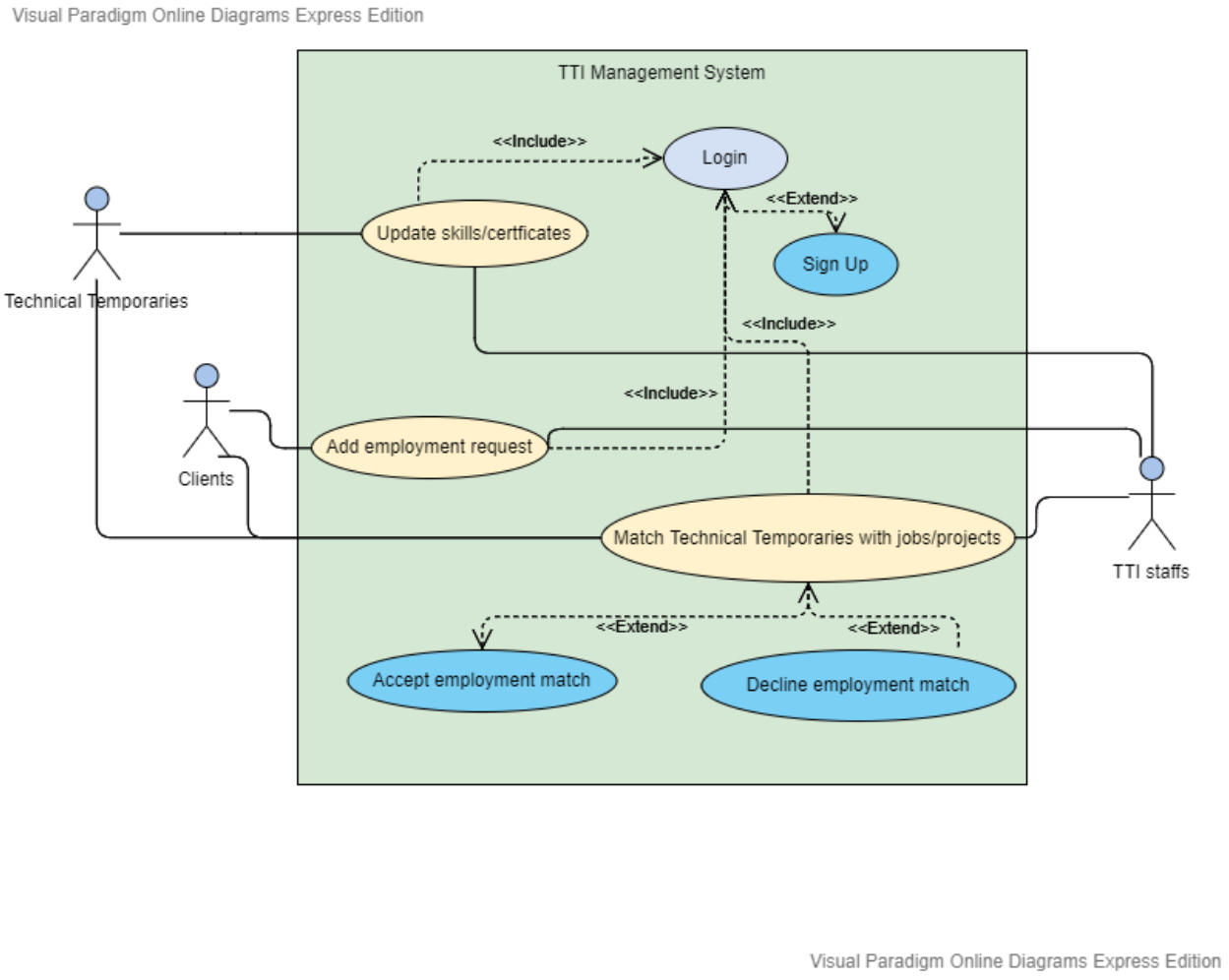
DESIGN CLASS DIAGRAM



CONTEXT LEVEL 1 USE CASE DIAGRAM: TTI Management System



USE CASE DIAGRAM: Fulfilling temporary employment request with technical temporary employees and clients



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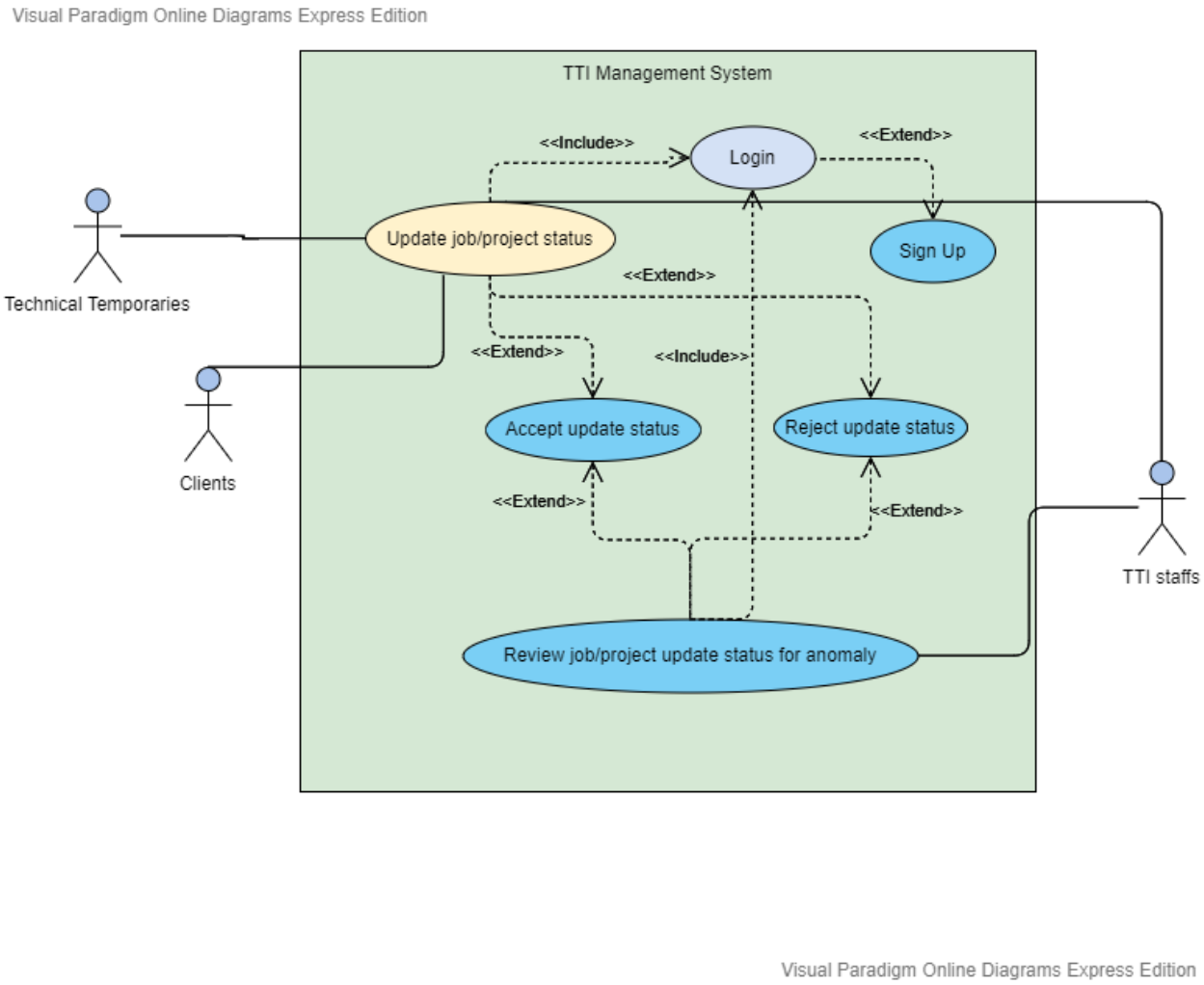
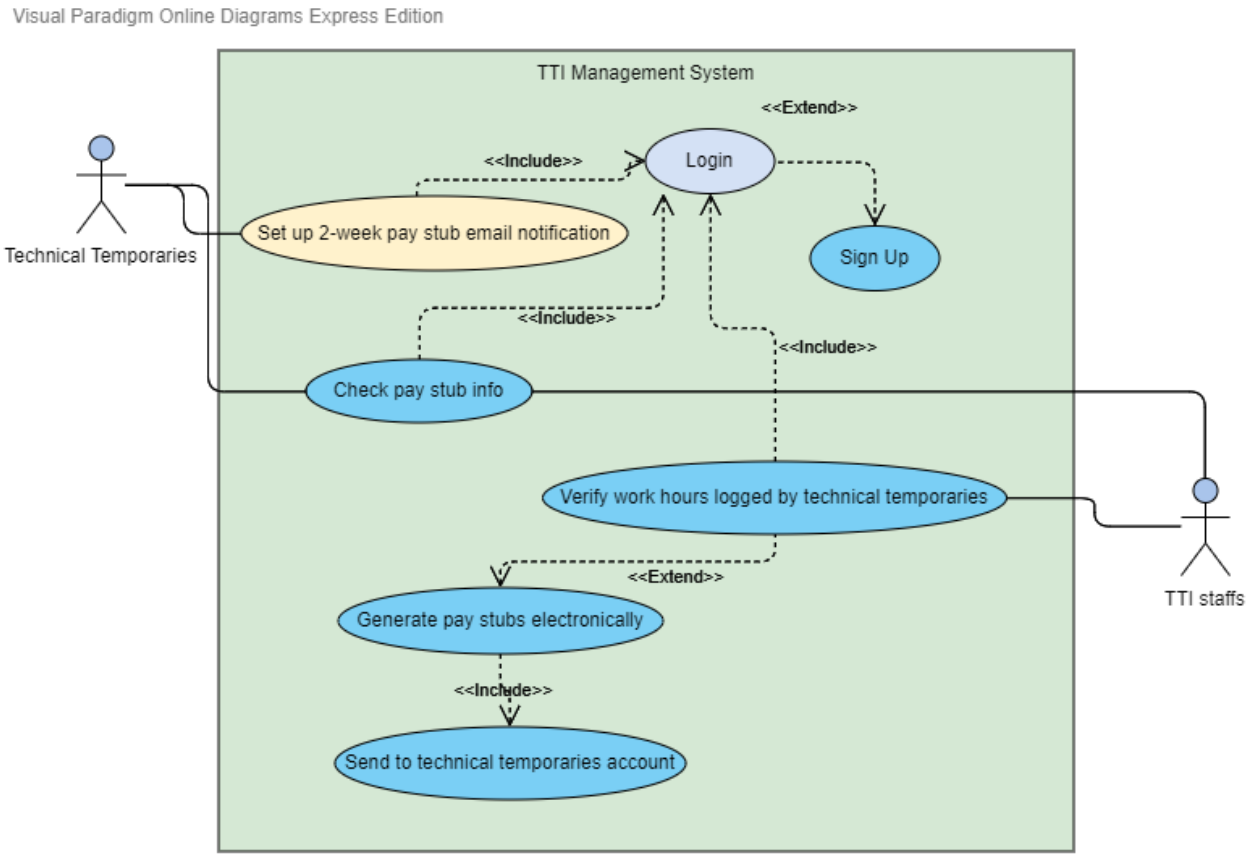
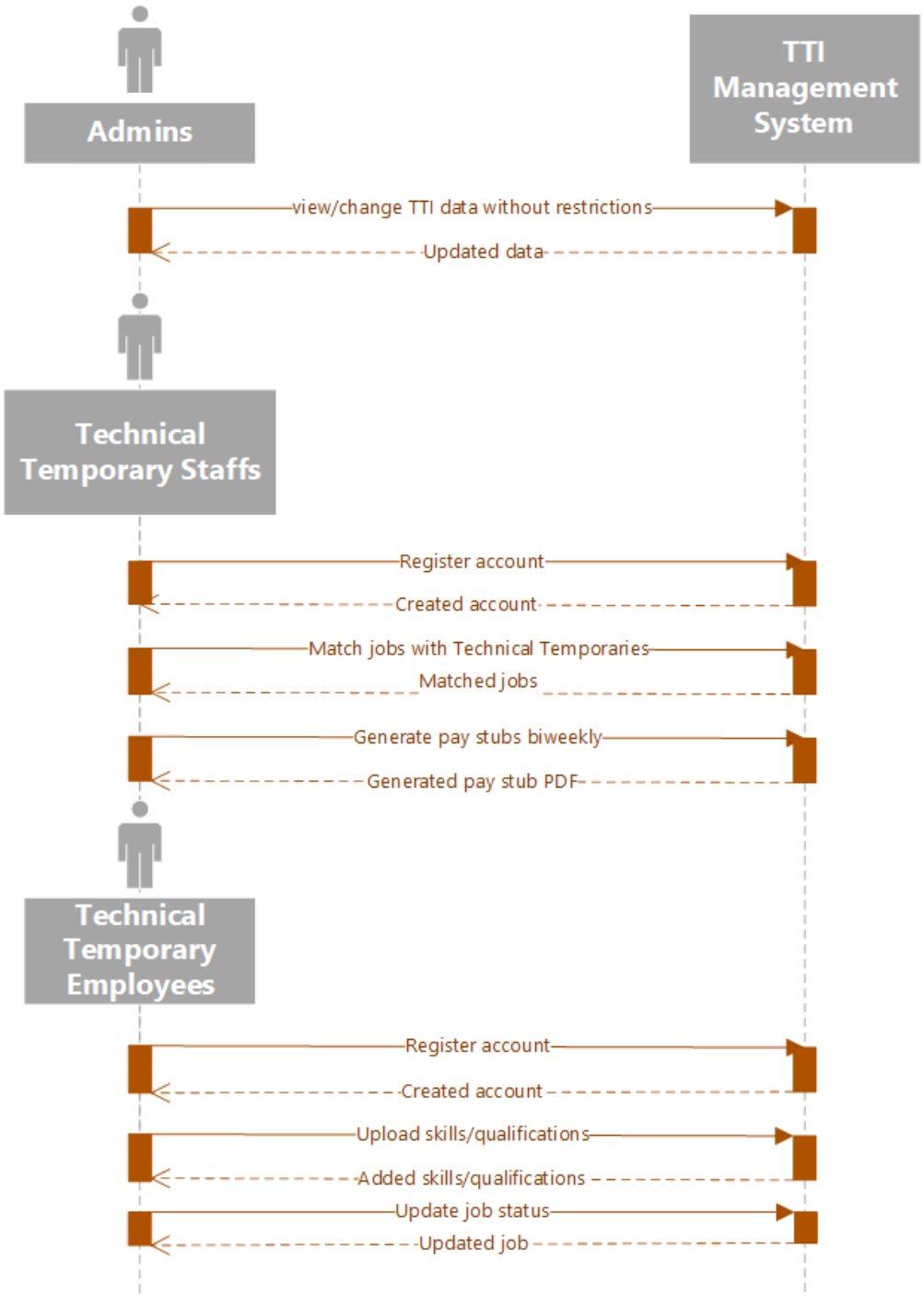
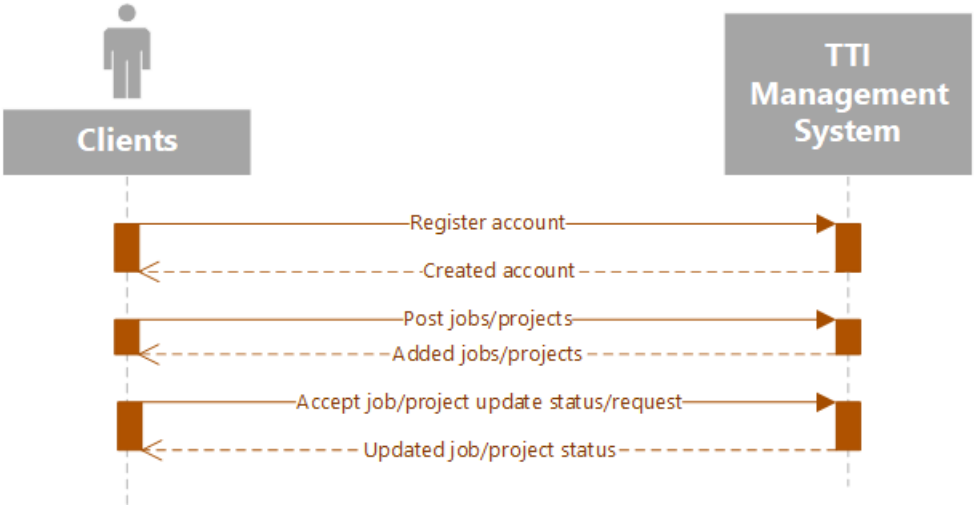


USE CASE DIAGRAM: TTI staffs issue paystubs to technical temporary employees

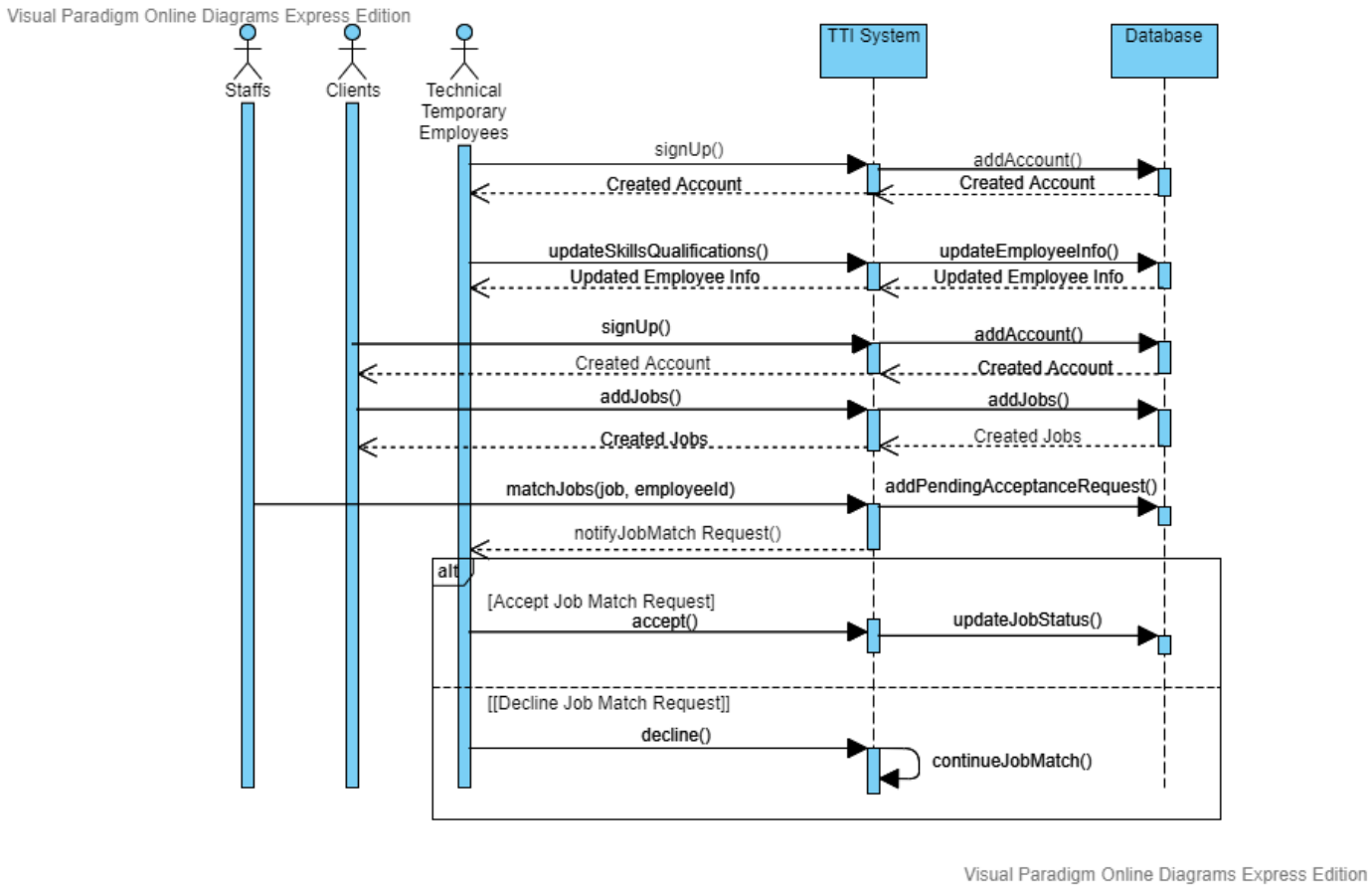


SEQUENCE DIAGRAM: Context Level

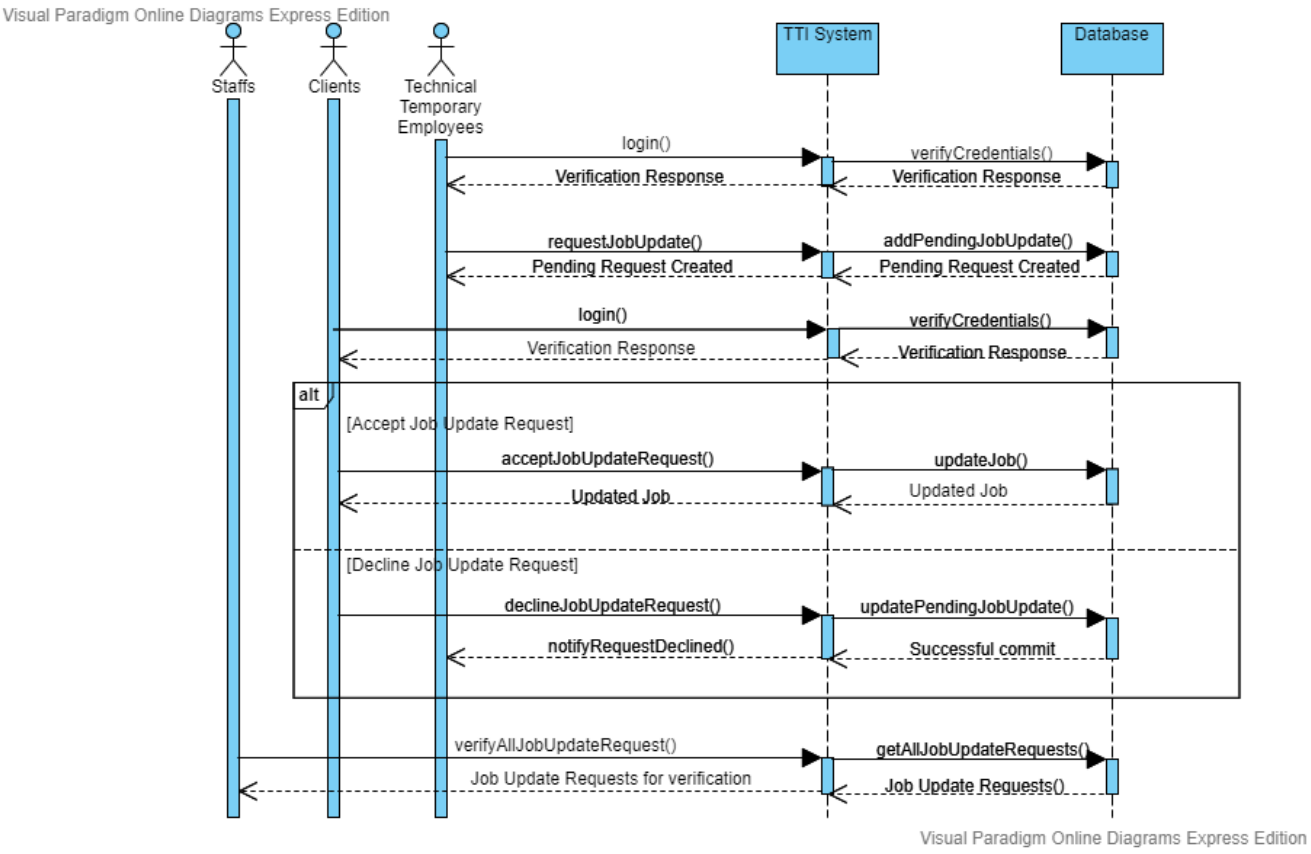



Clients
TTI Management System
Register account
Created account
Post jobs/projects
Added jobs/projects
Accept job/project update status/request
Updated job/project status

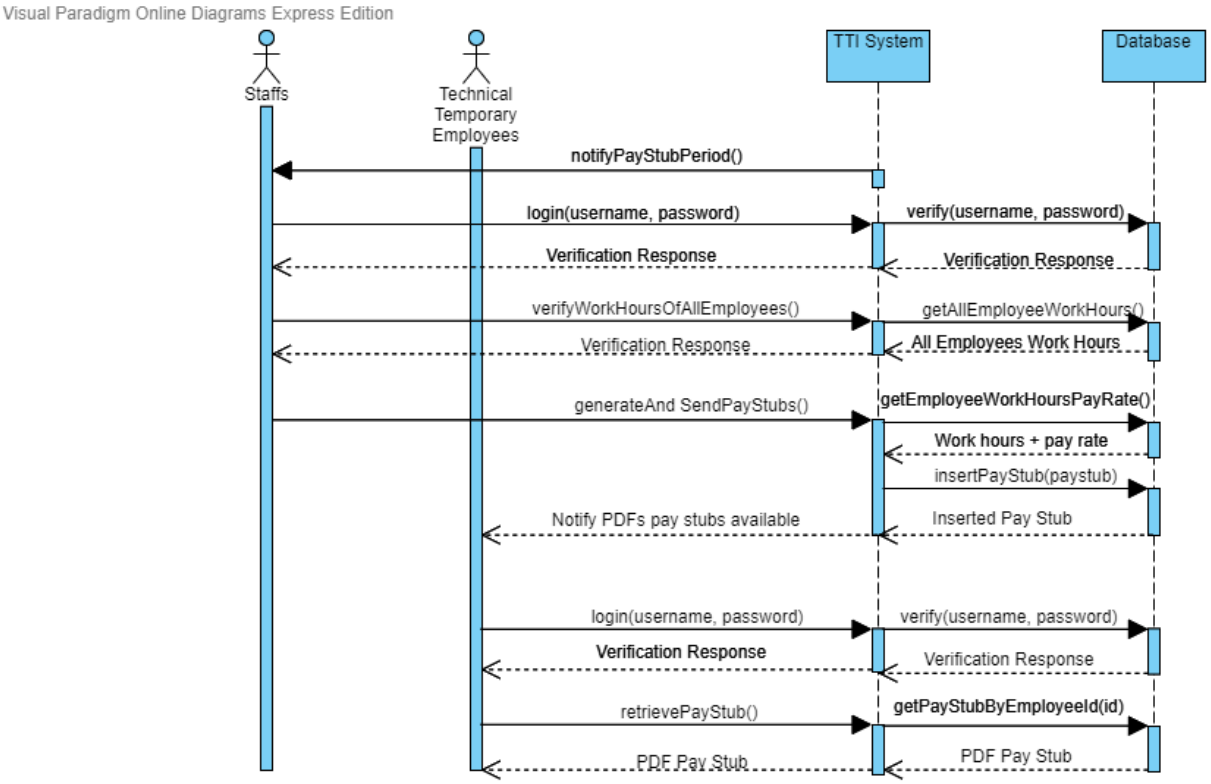
SEQUENCE DIAGRAM: Assigning a job to technical temporary employees



SEQUENCE DIAGRAM: Technical temporary employees update job/project status



SEQUENCE DIAGRAM: TTI staffs issue paystubs to technical temporary employees



Visual Paradigm Online Diagrams Express Edition

Recommended/suitable Network Topology Diagram:

In order for our TTI Management System to perform well and reliably, our development team has decided to adopt the Hybrid Network Topology as the main network topology for our server deployment. **Hybrid topology** is an interconnection of two or more basic network topologies, each of which contains its own nodes. Different types of network topologies can include Star, Bus, Mesh, or Ring [1].

The hybrid network topology is very scalable by its own nature as maintainers can easily increase the size of the network by adding computing nodes without network failure [1]. As discussed in our interview with Mr. Jones, site reliability and network scalability are the most essential feature of our system so the Hybrid topology will serve our needs perfectly. Some of the example advantages in using hybrid network topology include:

- A hybrid topology can resemble a Star topology as it can have the ease of connecting and removing devices without connection interruption for the rest of the network.
- A hybrid topology also can resemble a Bus topology by providing connection reliability to multiple third-party devices and peripherals such as printers, routers, and other data services [1].
- Fault detection and maintenance prove to be reliable and easy in hybrid topology. If a computing node goes down in a hybrid topology network, maintenance will not affect the computing power and performance for the rest of the network.

In consideration of all the advantages and disadvantages of all the network topologies gathered from our research, the hybrid topology is the best network topology for the TTI management system.

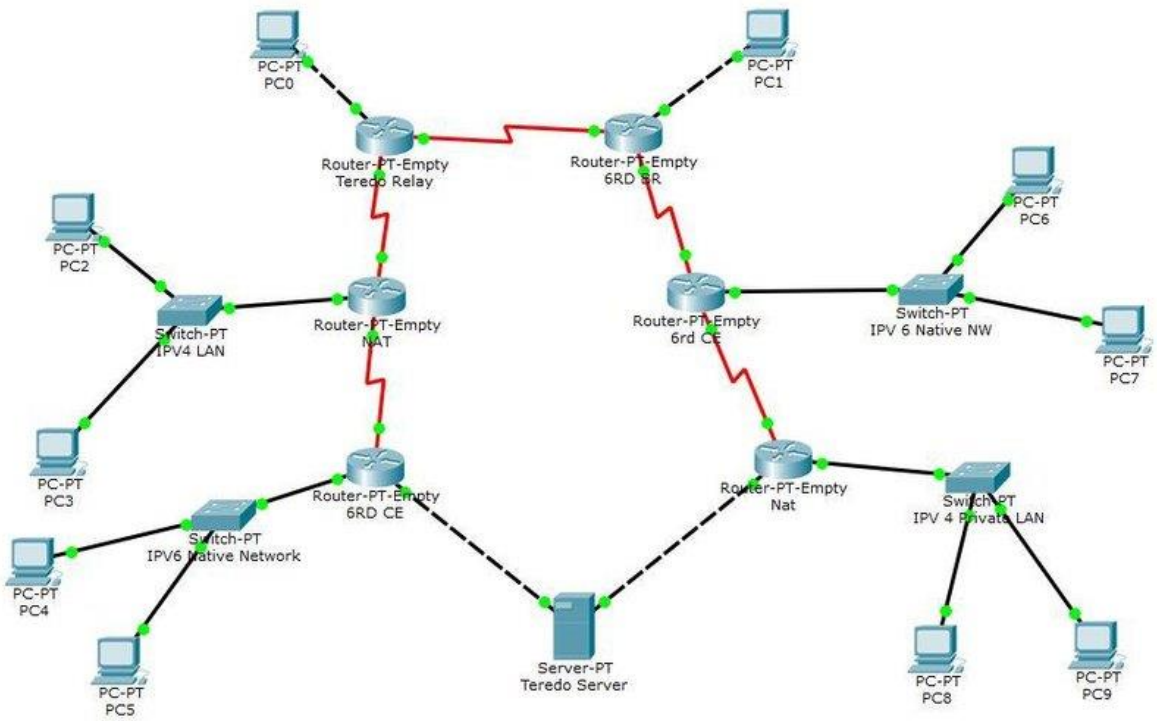
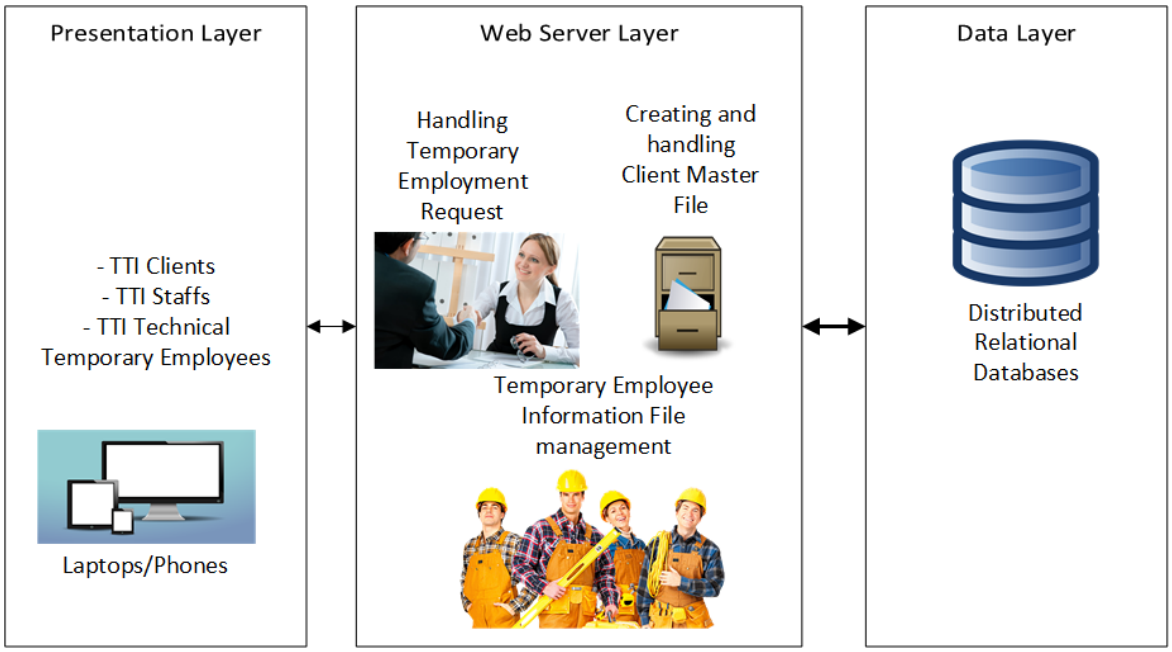


Figure: Hybrid Network Topology [2]

3 tier architecture Diagram



As the TTI management system requires reliable and proven architecture design, we have decided to go with the three-tier software architecture. The architecture divides the TTI management application into three separate layers with each one serving a distinct purpose. The presentation layer is the "front-end" side of the application which includes the User Interface and User Experience logic that can be handled on a phone or a web browser from the clients, staffs, or technical temporary employees' computer. The middle layer of the architecture is the web server layer which handles all the TTI business logic including handling Temporary Employment requests, creating and handling Client Master Files, and managing Technical Temporary Employee Information. The last layer is where all the bloodstream of the system relies: the database. For security and reliability reason, we have decided that our database will be distributed among 3 workers which can store backed up data from the main slave database. In case of system failure, the worker database can replace the main database and act as the primary data for reading and

writing. Developing the TTI management system around a three-tier architecture would allow us more scalability in allocating computing resources between layers, and it would also give Mr.Jones the flexibility in picking the right cost plan for deploying the system. In case one layer fails, the three-tier architecture by its nature is very resilient as each layer can be broken and fixed without affecting the other system layers.

Gantt Chart Diagram

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Develop UI/UX Design								
Choosing language/framework								
Develop database schema								
Develop prototype application								
Client Testing Phase 1								
Develop production application								
Client Testing Phase 2								
Production Deployment								
Official Release								

The Gantt chart above represents our tentative timeline for delivering this project. Please be noted that the time it takes for the development team to develop prototype application may vary between one week to two weeks due to the unpredicted nature of software development. Developing UI/UX Design, choosing language/framework, and developing database schema are tedious tasks, but they require a unifying agreement between group members, and that is why we believe one week is the best time period for this phase. After having successfully developing the prototype application, the application will be demoed to Mr. Jones to test for usability, and we will gather all possible feedbacks to finish our final product. Production application will be focused on afterward, and all of required protocols from SDLC will be carried to ensure the highest quality of the final deployment. The production application will be tested again by TTI employees and staffs this time for minor bugs and errors. After having rectified all of the

addressed problems, the final TTI Management system will be officially released. We only need one week for testing phases as the process itself is simple by nature, and we also only need one week to do the official release because DevOps process generally takes one week to develop.

10.1 Data Transfer from paper files to electronic media

Standardize naming conventions are crucial for the migration process from paper files to electronic media. All current Temporary Employee Master files, Client Master files, and Temporary Employment Request files will need to be migrated to the designated SQL system database and will follow strict IEEE database naming convention. This is crucially important because if any of the current paper data that does not follow the mentioned naming convention, it will be **very hard** for the system logic to behave accordingly. We want to save time and minimize frustration for both the developers and the clients.

We strongly believe TTI has some existing images of the contracts from many current technical temporary employees that need to be transferred to electronic media. Considering all the service providers and API specifications out there, we have decided to use Google Cloud Vision API to detect the content of a contract and normalize the content in SQL format so that it can be inserted to the database.

We will also provide a message notification for every Technical Temporary employee and staff that reminds them to notify their administrators if they find some of their data has been entered incorrectly.

Data transfer [4]

10.2 Risk/Failure in Deployment/Implementation

All communication with clients and TTI staffs will be properly conducted to make all actual use cases transparent to the end users. All measurements will also be taken to fully meet any existing or future requirements that can safeguard against any of the following scenarios:

1) Our system has a loophole logic in our job matching algorithm that prevent job match between our clients and temporary employees.

2) Technical Temporary staffs are unable to modify/insert data record of technical temporary employees

3) Network failure which lead system to being unable to operate.

4) Our latest system update breaks existing data records or functionalities.

10.3 Support to Client in case of risk/failure

It is critical for the TTI management system to be up 24 hours a day, and in order to better assist Mr. Jones with the system, we are providing a Site Reliability Engineer who can troubleshoot all the system related problems and fix them in the shortest time possible. Our Site Reliability Engineer can be easily contacted via our chat application on our portal, and once he is notified of the problem, he will remotely take control the system to rectify any technical problem. During the early deployment phase of the project, we will also provide two extra developers to maintain and develop small features should the needs arise. There will also be a "Help Me" contact directory that is available to Mr. Jones so that he knows who to contact once troubles occur.

10.4 Installation Strategies (one shot or incremental)

All paper files and documents will be gathered around for developers to automate the task of entering existing employee data into the database. All dependencies that are required to run the management server will be locked as read-only file to prevent version incompatibility between dependencies.

We will install TTI Management System in a one-shot manner, meaning that it will be ready to run as soon as it has been successfully installed. The server system will pull the Docker image file that contains all the system configuration, installation commands, secret keys and public keys from our registry image cloud server and run it as an executable. All the installation steps and procedures have already been automated by the Docker image in order to save both the developers and client's hassle.

This all-in-one installation strategy will facilitate TTI Inc. to start using the application right after the deployment which allows employees and staffs to get used to the system in the shortest time possible. Annual update may be required after installation depending the system specifications and configurations.

10.5 Training Sessions (how is it planned)

The new TTI management system will provide concise and easy walkthrough that will ensure a smooth transition from the old traditional paper-based system to the new and modern web application system with limiting interruptions to productivity. Training sessions will follow along these three modules:

1) Online training – We will provide an online tutorial walkthrough that highlights all the essential tools and widgets that are available in the web application. This online training will be mandatory for all new incoming users including employees and staffs in order for users to fully understand the whole system before making any breaking changes.

2) Onsite training and Q&A – Two of our senior developers will be available on campus on the first two days of deployment to answers any questions may arise from the employees and staffs. They will hold a big meeting with all the key staffs to demo all the key features and configuration of the whole system. They will also provide guidance on how to maintain and troubleshoot some of the most common problems that can happen to system. Some common maintenance techniques may include rolling system back to the previous version, verifying file integrity, or backing up databases periodically.

3) Online support – Our online support is available at all time. You can reach to us via our chat application on our website portal and a representative will be able to assist you in the shortest time possible.

RECOMMENDATIONS

With this system, TTI management system can quickly provide temporary employment request with the ease of accessing the system from anywhere. The web interface allows us with comprehensive control over system troubleshooting, and it will not hinder TTI's normal business daily schedule. The system provided an autonomous interaction between TTI clients and technical temporary employees that will speed up the employment matching process and provide a seamless experience for all the parties involved.

With a completed requirements analysis, we hope that you can analyze all the project modules from the diagrams presented. If there is a change that you think it needs to be changed, please feel free to contact us. We will follow your recommendations and will improve our solution using the simplest protocol.

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