Software and System Test Plan

Employee Tracker

COP4331C Fall 2017

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I. Test Plan

Overall Objective for Software Test Activity

The software test effort will discover faults that could cause failures in the Employee Tracker mobile and web application. A successful test effort will be defined as one that finds faults that allows the development team to issue corrections leading to successful acceptance testing. The software test effort will be considered a failure if it finds few or no faults in the web and mobile application and fails acceptance testing. Manually testing will be done, however, this is to be noted that it will not be our main source of testing.

Through a set of Unit Tests we will aim to achieve small functionalities within components and ensure they work correctly. These functions are to be thoroughly tested so that basic actions (clicking buttons, pining Firebase, etc.) work without a doubt. This will help us create more elaborate Integration Tests along the course of the test phase.

Through a set of Integration tests we will aim to achieve larger scale functionalities work, components are talking to each other, etc. We will comprise Integration tests around the bigger core functions of the application. Having previously mentioned thorough unit tests, this will better help us when comprising these tests.

Description of Test Environment

Jest, developed by Facebook and Enzyme, developed by AirBnB are popular unit testing software for React and Javascript components. Since React is developed by Facebook and Jest is included in React, using Jest to test our software is sensible. Facebook uses Jest to test their own React applications.

The hardware environment that the web application will be tested on will include Windows laptops, desktops, and Mac laptops and desktops. The development team is in possession of this hardware for the purposes of developing and testing the Employee Tracker web application.

- A. Windows
 - a. Laptop
 - i. Windows 8
 - ii. Windows 10
 - b. Desktop
 - i. Windows 10
- B. Mac
 - a. Laptop
 - i. macOS High Sierra
 - b. Desktop
 - i. macOS Sierra

As Windows includes Internet Explorer on the previous Windows 8 OS and Edge on the latest Windows 10 release, they will be included as native testing for the respective operating systems on the Employee Tracker web application. macOS includes the latest version of Safari on all recent releases of the OS and will be included as native testing on the Employee Tracker web application. This accounts for the last 5 years of Windows releases and the last 2 years of macOS releases. This means that we will be able to perform software testing on hardware in the native environment of the respective web browsers. We will be also be testing Chrome and Firefox in all environments. The latest stable version of each web browser we will be testing is Chrome (v.62.0.3202), Firefox (v.57.0), Microsoft Edge (v.41.16299.15), Safari (v.11.0.1), and Internet Explorer (v.11.0).

The hardware environment that the mobile application will be tested on will include Android and iOS devices. The development team is in possession of this hardware for the purposes of developing and testing the Employee Tracker mobile application.

- A. Android
 - a. Phone
 - i. Android KitKat (v.4.4.4)
 - ii. Android Nougat (v.7.1.2)
- B. iOS
 - a. Phone
 - i. iOS 9
 - ii. iOS 11

As both mobile operating systems are highly fragmented relative to the desktop operating system releases, the scope of the native mobile hardware testing will be less thorough. Fortunately there is a good spread of older and newer devices which will help ensure that performance testing can occur on older devices. This accounts for the last 4 years of mobile operating systems on Android and 2 years of iOS releases. This means we will be able to perform software testing on native hardware instead of the respective simulators.

The test team will consist of the developers on our team as outlined in previous deliverables. As we don't have the resources or manpower to form an independent test team, we will do the best we can with our available resources.

Stopping Criteria

When testing, we will determine when to stop when we have exhausted all options for that particular test case. We will NOT design test cases around our code just to make the tests work. We will create to the best of our ability fully in-depth test cases. When our tests fail, we will stop testing and find errors in code that we can easily fix. If this error is not easily fixable or the person testing is not knowledgeable in this area we will then bring it up in our stand up meetings. Then moving onto the next test, without having to fully stop and wait for someone to help.

As previously stated we will try to make very in-depth test cases, so we will most likely get at least one error. But, in the case that we do not, we will create a set of overlay tests on top of the

originals. We believe that testing is the most important part of making software work, hence very in-depth Unit and Integration Tests.

Many places in the workforce define "good enough to deliver" when you are getting a binary comparison when running a test in QA environment. Although, we do not have such an environment to test our software in, we will conduct full regression testing on features in our own production environments. We will carry out all necessary and unnecessary functions needed on each and component. Once we get our own sense of security that our version of this "binary comparison" test is sufficient, we will deem it good enough to deliver and let the customer decide.

Description of Individual Test Cases

Test ID	Test Objective Test Description		Test Conditions	Expected
				Results
T.3.1.1	This test will determine if the login	This test will input strings of a	Mobile	Case 1: App
	component of the mobile	valid username, password	Application only,	receives uid,
	application correctly allows login	(employ,weak@\$\$), an invalid	application must	logs user in.
	and prevents unsuccessful logins.	username, password (employ333,	be on login page.	Case 2: App
		any\$#1s), and an valid username,		does not
		invalid password (employ,		receive uid,
		wrong\$\$) into the login page of		instead
		the mobile application. A uid will		receives 401:
		be returned on successful login.		Forbidden
				HTTP
				response, does
				not log user in.
				Case 3: App
				does not
				receive uid,
				instead
				receives 401:
				Forbidden
				HTTP
				response, does
				not log user in.
T.3.1.1.2	This test will determine if the mobile		Mobile Application,	Database
	application correctly sends an	on a test phone, actual gps location	Firebase Database	receives
	updated GPS location periodically	of phone sent back to the database		location data
		will be compared for accuracy and		after user login
		compliance. A GPS location will be		at a regular
		returned periodically for a successful		interval.
		test run.		
T.3.1.2	This test will determine if the web	This is a mix of a observational	Web application,	The unit test

	on a map	and unit test. For the list, the test will pull the list of employees from the database, and compare it directly with the list of employees in the web application to see if they match. The test for the map being populated will be an observational test, where us (the developers) will ensure that the map is displaying the location of the employees correctly by comparing the location in the database to the location on the map.	after build before deployment to firebase.	returns a "Pass" and the employees coordinates match with the coordinates on the map.
T.3.1.3	This test will determine if the applications correctly accept valid passwords that conform to a standard, and deny invalid/nonconforming ones.	This test will input strings of a valid username, password (employ,weak@\$1\$), an invalid username, password (employ333, any\$#1s), and an valid username, invalid password (employ, wrongpa\$\$) into the login page of the mobile application. A uid will be returned on successful login. The standard is the password must have a lowercase letter, a number, and a symbol	Mobile and web application.	The applications accept passwords that conform to the rules, otherwise they deny them.
T.3.1.4	This test will determine if the mobile application will continue to collect gps coordinates for a maximum of 30 minutes on data/connection loss.	-	Mobile Application, Firebase Database	After disconnection from the database the test phone local cache will begin locally storing location data. User will be logged out on Mobile application after greater than 30 minutes of disconnection from database.

T.3.1.5	This test will determine the	This test will disable data transfer	This test will be	A error
1.5.1.5	success of the alert system in the		run in the mobile	
	_			message
	applications. If the mobile	then start a timer at the time of	application, both	"Connection/ca
	application fails to connect for 30	disconnect. If there is no	emulator and a	mera/gps
	minutes, camera, or gps fails, an	connection within 30 minutes, the	physical device	failure" is
	alert will be generated.	employee will be forcibly logged	before building.	generated, and
		out. This test will also trigger a		if a connection
		controlled camera failure and gps		is present, then
		failure. The test will ensure that a		the
		text notification of		userMessage
		"Connection/camera/gps failure"		field of the
		to the employee. If a connection is		respective
		present, the message also get		employee's
		sent to the database.		database in the
				server now
				contains that
				same
				message.
T.3.1.6	This test will determine if the mobile	The test will begin after login and	Mobile Application,	After
	application correctly sends GPS	tracking has begun on a test phone.	Firebase Database	disconnection
	locations collected when	The connection to the database will		from the
	disconnected from the internet,	be cut off and the phone will		database the
	upon successful reconnection.	continue storing location data in a		test phone local
		local cache. After a time less than 30		cache will begin
		minutes but greater than two		locally storing
		location update periods, connection		location data.
		will be reestablished with the		Upon
		database and locally cached location		reconnection,
		data will be sent to the database		phone sends
		along with new updated positions.		locally cached
				location data,
				along with new
				updated
				location data
				periodically.
T.3.2.1	This test will determine if the mobile	This test will input strings of a	Mobile and Web	Case 1: App
	application correctly passes	valid username, password	application, and	receives uid,
	inputted credentials to firebase, and	(employ,weak@\$1\$), an invalid	Firebase for	logs user in.
	firebase then correctly verifies the	username, password (employ333,	authentication	Case 2: App
	employee.	any\$#1s), and an valid username,		does not receive
		invalid password (employ,		uid, instead
		wrongpa\$\$) into the login page of		receives 401:
		the mobile application. A uid will		Forbidden HTTP
	1	1.1	l	1

		be returned on successful login.		response, does
		be returned on successful logili.		
				not log user in.
				Case 3: App
				does not receive
				uid, instead
				receives 401:
				Forbidden HTTP
				response, does
				not log user in.
T.3.2.2	This test will determine if the mobile	This test will read all connections	The mobile	The
	application correctly interfaces with	to the database for a period of 10	application, after	connections
	the firebase database through	minutes. It will then attempt to	building	are valid REST
	RESTful requests.	parse them as REST requests.		requests. The
	·			test then will
				return a "Pass"
				message.
T.3.2.3	This test determines that the	After login and tracking has begun on	Mobile Application,	-
	precision of the GPS locations is 6	a test phone, actual gps location of	* *	receives 6-digit
	decimal places, and that it gets sent	phone sent back to the database will		decimal
	to the firebase database	be compared for accuracy and		precision
	periodically.	precision of 6 decimal places. A GPS		location data
	periodically.	location will be returned periodically		after user login
		for a successful test run.		_
		for a successful test run.		at a regular
				interval and is
				returned.
T.3.2.4	This test will determine if the web	This test will read all connections	The mobile	The
	application correctly interfaces with	to the database for a period of 10	application, after	connections
	the firebase database through	minutes. It will then attempt to	building	are valid REST
	RESTful requests.	parse them as REST requests.		requests. The
				test then will
				return a "Pass"
				message.
T.3.4.1	This test will determine if there are	This test is purely observational	The Mobile, Web	There are
	three groups available to be logged	from the developer view. If there	application, and	three individual
	in.	are three classes that represent	the Firebase	groups/classes
		Employer, Employee, Admin, then	database	implemented.
		the test passes.		
T.3.4.3	This test will verify that Employees	For this test, a logged in	A employee is	A 401:
	do not have access to Employer	Employee should not have access	logged in via the	Forbidden
	permissions and vice versa.	to "add/remove employee" that	mobile application	
	permissions and vice versa.	the Employer has. A POST		response.
		request containing the method		response.
		request containing the method		

		updateEmployee() will be sent from the mobile application. If it returns anything but an 401 Forbidden error, the test will fail.		
T.3.4.4	This test will verify that a training manual is provided.	This is another observation test. At the time of client implementation, a training manual is provided. If the manual is not provided, the test fails.	The client chooses to implement the software system	A training manual is provided
T.3.5.1	This test will determine if the training manual has been updated when the software updates.	This test compares the commit history between the code and the manual. If no commits to the manual occur within 10 code commits, the test fails.	The developer space/repository system is in use	The commits to the manual should occur within every 10 code commits. If not, the test fails.
T.3.5.2	This test will verify that the documentation has images and diagrams.	This test will grep the documentation file for any image extensions. It will also verify that those referenced image files exist in the referenced directory	This test will be run when we build the applications.	Image extensions with existing referenced files will exist, resulting in a "Pass" from the test.
T.3.5.3	This test will verify that the documentation is concise.	This test will compare the word count of the documentation to the number 15000. This number comes from the average of 300-350 words per page, and the maximum page length we set as 50 pages.	During after build time of mobile and web applications.	The test returns "Pass" if the word count is less than 15000.
T.3.5.4	This test will verify that the documentation is presented in layman's terms, no jargon in it.	This is an observational test. This test involves us (the developers) reading through the documentation and ensuring that there is no complex technical terms.	After final build of applications, before publishing work.	There are no technical terms involved in the documentation.
T.3.5.5	This test will verify that all interactable portions of the software are documented with explanations.	Another observational test. This involves us (the developers) going through the documentation and ensuring that every time we have a updated render() in the code,	After final build of applications, before publishing work.	There is a corresponding description of every render() update in the

		there is a corresponding		code to a
		description in the documentation.		paragraph in
				the
				documentation.
T.3.6.1	This test will determine if degree of		Mobile Application,	6 digit
1.5.0.1	GPS precision is correctly 6 decimal		Web Application,	longitude and
	places for latitude and longitude.		Firebase Database	latitude
	places for latitude and longitude.	After login and tracking has begun	l liebase Database	location data
		on a test phone, actual gps		sent from
		location of phone sent back to the		phone will
		database will be compared for		match 6 digit
		-		longitude and
		accuracy and precision of 6		latitude data on
		decimal places. Location data will		
		be compared on phone and from		database and
		database to actual latitude and		Map view. This
		longitude coordinates. Matching		will be in
		longitude and latitude from phone,		format
		Map View, and database will		(28.6024 N,
		provide a successful test run.		81.2001 W)
T.3.6.2	This test will determine if GPS	User will login to test phone and	Mobile Application,	Location data
	coordinates in the form of latitude	begin GPS tracking. A successful run	Firebase Database	from mobile
	and longitude for each individual	will consist of correct data being		phone will be
	employee are successfully retained	logged in database.		correctly logged
	in the database.			in Firebase
				database.
T.3.6.3	This test will determine if the	Using our own dummy data of the	Firebase database	Each
	employee's name and unique ID are	six of us will allow us to automate	test with string	employee has
	retained together in the firebase	this and quickly discover whether	comparisons of our	a unique ID
	database.	or not the test cases are off. This	own information.	assigned to
		test will iterate through all location		them in the
		entries in the database, and		database. A
		ensure that each employeeName		result of "Pass"
		had a corresponding unique ID.		is generated
				on success.
T.3.6.4	This test will determine if the date	This test will iterate through all	Database	Each location
	and time of the gathered GPS	location entries in the database,	connection, when	has a
	coordinates are retained	and ensure that each location	database is filled	corresponding
	alongside the rest of the gathered	entry had a corresponding	with dummy data.	timestamp. A
	data in the database.	timestamp in ISO format	,	result of "Pass"
		,		if this is true.
				Otherwise,
				"Fail"
				. un

T.3.6.5	This test will determine if all logins are successfully logged in the database.	Multiple correct and incorrect logins will be conducted on the Web and Mobile applications, and data will be sent to the database. Database will then be checked against login attempts for corresponding data.	Mobile, Web application, Firebase for data logging	Case 1: User logs in, data is logged correctly in database. Case 2: User attempts to log in using incorrect information, database logs incorrect attempt with corresponding data.
T.3.7.1	This test will determine that the database will provide long lasting storage for the information gathered.	Documentation will be reviewed to show that our version of our database is stable and provides longevity.	Periodic installs of our backups on test servers to ensure backups are working correctly	Test server with backup successfully passes all automated
			Working correctly	testing.
T.3.7.2	This test will verify that a system administrator has access to the firebase database and can debug.	Observational Test. One or more intentional bugs to ensure proper response.	Mobile Application, Web Application, Firebase Database	All intentional bugs (viewed only by developers) are viewable.
T.3.7.3	This test will verify that the Employer utilizing this software will provide the employees with all necessary technology.	Peer Review System. This will be a user response test in which we provide a way to give feedback to us to ensure the safety and privacy of our users.	Mobile Application, Web Application	Periodic automated tests on the feedback system to ensure developers are receiving feedback by its users.
T.3.8.1	This test will determine if access to the system is successfully controlled and secured by logins for each client.	Ensures only the correct user is viewing information they are allowed to view and nothing else. The test will ensure that the login for a employee only retrieves data for that employee, and no one else. This will be done by comparing the information returned on login to the login	Mobile Application, Web Application, Firebase Database	Case 1: URL testing of what might allow a view of another user. Case 2: Validating users in the database are

		status of the employee in the		not connected
		database.		to other users'
				information.
T.3.8.2	This test will determine if the	We are ensuring the user can only	Mobile Application,	Same as
	client's data is successfully isolated	log in to their own accounts.	Web Application,	T.3.8.1
	from other clients through logins.		Firebase Database	
T.3.8.3	This test will verify that the client's	Implementation can be seen within	Firebase Database	We will have a
	data is encrypted with the AES	the firebase data. Observation.		dummy row of a
	256-bit standard.			user in the
				database and
				will string check
				known values
				with the
				database to
				ensure none
				match, if so,
				then the
				encryption is not
				occurring.
T.3.8.4	This test will determine if the	A couple standard attempts in user	Mobile Application,	There are many
	database is hardened against SQL	input fields to ensure that the sql	Web Application	testing suites to
	injection attacks.	fails to be injected.		test this, which
				will be
				implemented,
				which could
				include oWasp
				or sqlmap
T.3.8.5	This test will determine if the	During start up of the system, we	Firebase Database,	All automated
	system is successfully backed up,	will make a backup and rerun the	Mobile and Web	and
	and is backed up periodically.	application to ensure that the	Application	observational
		backups are in fact working and		testing works on
		then periodically check on		the live backup
		whether firebase is still making		environment.
		backups.		
T.3.8.6	This test will verify that the	We will test current applications	Mobile	Our testing will
	employee using the web application	that allow gps spoofing and check	Application.	be more hands
	is unable to spoof their location.	whether the system is aware of	Firebase	on, using sqlmap
		the spoofing. The test will also tie	Database, after	as well as other
		into Android's SafetyNet and	building before	applications to
		Apple's equivalent security	deploying.	spoof our own
		system. If the test detects root or		location and
		jailbreak privileges, or that		determine

		developer settings are enabled and thus location spoofing, the app will generate an alert message and send it to the database. There is also observational testing, where the Employer ensures to provide the employees with locked down devices.		whether or not the system is aware.
T.3.9.1	This test will determine if the	Observation and Administration	Mobile and Web	All automated
	Employee Tracker software is	testing will test this.	Application.	testing and
	available as a web and mobile		Firebase	observational
	application.		Database,	testing will must
				be passed to
				ensure both
				applications are
				up and running.
T.3.9.2	-	Observation. GitHub allows users	Github, git log.	Observation will
	is maintained by the people in	to see who is editing and when it		show whether
	Group 6: Employee Tracker, in class	has occurred.		or not updates
	COP-4331 during the Fall 2017			have been made
	Semester.			as and the
				whole team is
				developing the
				product.
T.3.9.3	This test will verify that the testing	Other than observational testing,	Debug logs within	This will be
	suite is automated.	we will be able to run scripts that	our applications	observational.
		run automatically and print in a		We will check
		debug log of any errors that could		the debug logs
		have occurred.		for any
				detrimental
				activity and
				react
				accordingly.

Trace of Individual Test Cases to the Requirements Traceability Matrix

Req ID	Requirement Description	Architecture Reference	Design Reference (component/module)	Test Case Reference	Status
3.1.1	The Employee Tracker shall allow the Employee to log in, update location, and see other users using the mobile application	Employee Login, Tracking status	Login < <interface>>, Mobile Application</interface>	T.3.1.1	
3.1.2	The Employee Tracker shall allow the Manager to see updates from the employee on the web application.	Employer Login, Select Any Employee	View, Web Application	T.3.1.2	
3.1.3	The login username and password will be verified to be valid according to the requirements set by the company.	Employee Login, Customer Login	Connection, Firebase Database	T.3.1.3	
3.1.4	The mobile application will continue running and collecting location coordinates for up to 30 minutes if loss of internet connectivity occurs. After 30 minutes, the system alerts both the user and the employer that the device has not had a connection for 30+ minutes.	Checks Tracking status, Employees Have Location turned on.	Connection, Mobile Application	T.3.1.4	
3.1.5	The mobile application will notify the user and the employer if the mobile device's GPS or camera malfunctions.	Clicks Employee Details, Turns Tracking on/off, Makes changes to the database information.	Web application, Mobile application	T.3.1.5	
3.1.6	The mobile application will send the locally stored locations to the server upon successful reconnection.	Makes changes to the Database Information.	Mobile Application	T.3.1.6	
3.2.1	The Employee Tracker application shall check username and password for each user login. The username and password inputs will be sent as strings to be checked and be validated with Firebase. The data must be exact as it is credentials for a user.	Employee Logs in, Customer Logs in	Connection, Firebase Database	T.3.2.1	

		1	1	,	
3.2.2	The Employee Tracker application shall fetch, the (fetch method), and post requests to and	Retrieves Database Information, Makes	Connection	T.3.2.2	
	from Firebase to validate against the	changes to Database			
	frontend that what the user input has	Information,			
	integrity.	iniormation,			
3.2.3		Check Tracking	Mobile Applications	T.3.2.3	
	shall send its location with 6 points of	Status, Makes	Location		
	precision to the server immediately, and	Changes to database			
	every 10 minutes thereafter, for the duration	Information			
	the user is logged in, or until a period of 30				
	minutes of no connectivity to the server				
	passes.				
3.2.4	All data transfers between the Firebase	Database, Retrieves	Connection	T.3.2.4	
	server and the web or mobile application	Database			
	shall be through a RESTful API.	Information.			
3.4.1	The Employee Tracker Application shall have	Employee,	Web application,	T.3.4.1	
	these 3 user groups: The Employer,	Customer, Admin	Mobile Application,		
	Employee, and Admin.		Firebase Database		
3.4.3	The Employee Tracking App shall prevent	Turns tracking on	Connection, Login,	T.3.4.3	
	misuse by the user groups	off, makes changes	Mobile application		
		to database			
		information.			
3.4.4	Users shall be provided training and copies of	Database,	Documentation	T.3.4.4	
	the Employee Tracking Application manual,	Client-Server			
	thus minimal knowledge of the system is				
	required. The only ability required is being				
	able to follow a procedure outlined in the				
	manual, and being able to read at smallest an				
	11pt font.				
3.5.1	The documentation shall be stored with the	Documentation	Documentation	T.3.5.1	
	software and updated in accordance to				
	functional changes of the software.				
3.5.2	The documentation will have pictures and	Documentation	Documentation	T.3.5.2	
	diagrams of the software, with footnotes				
	explaining what each button does.				
3.5.3	The documentation should be concise and	Documentation	Documentation	T.3.5.3	
	not span hundreds of pages.				
3.5.4	The documentation shall have no usage of	Documentation	Documentation	T.3.5.4	
	legalese or other complicated technical terms				
	or jargon that would confuse a user.				
3.5.5	The documentation should explain all parts of	Documentation	Documentation	T.3.5.5	
	the software the user can interact with.				

		T	T	1
3.6.1	The degree of GPS precision shall be 6 decimal places for latitude and longitude. For example, (28.6024 N, 81.2001 W) which are the GPS coordinates for the University of Central Florida. The accuracy of the GPS data will vary depending location, weather and the number of satellites in line of sight to the GPS hardware on the mobile device. The Google Maps API will be used to facilitate this requirement.	Database, Retrieves Database Information	Documentation	T.3.6.1
3.6.2	GPS coordinates in the form of latitude and longitude for each individual employee must be retained in the database.	Database, Retrieves Database Information	Firebase Database, Algorithm	T.3.6.2
3.6.3	The employee's name and unique ID will need to be retained together in the database.	Database, Make changes to the database.	Database	T.3.6.3
3.6.4	The date and time of the gathered GPS coordinates shall be retained alongside the rest of the gathered data in the database.	Database	Database, User,	T.3.6.4
3.6.5	Logins shall be retained in the database.	Client-Server, Repository	Database, Login	T.3.6.5
3.7.1	A database shall be required for the backend to provide long term storage for our client's data. As our client's grow in number the costs associated with the Firebase database platform we chose will grow as well.	Database	Firebase Database	T.3.7.1
3.7.2	A database administrator(s) will be needed to perform maintenance on the system as required. The system may need to be debugged at times and this action will require skilled personnel.		Firebase Database	T.3.7.2
3.7.3	The Employee Tracker application shall require the client to have access to computers and the client's employees to have access to mobile devices. We will not need to provide any hardware to the clients for the application to function as intended. In addition, we will not require physical space or supporting amenities as the client's business will cover those aspects of their operation.	Subscriber	Web Application, Database	T.3.7.3

3.8.1	Access to the system shall be controlled and secured by logins for each client.	Server-Client	Firebase Database	T.3.8.1	
3.8.2	Client's data shall be isolated from other clients through logins.	Server-Client	Firebase Database	T.3.8.2	
3.8.3	Client's data shall be encrypted with 256-bit AES standard	Database	Firebase Database	T.3.8.3	
3.8.4	Database shall be tested against SQL injection	Database	Firebase Database	T.3.8.4	
3.8.5	Automatic backups shall be performed once per day offsite (Firebase cost dependent). Backups are off site on Google's servers and protected from water, fire and other natural disasters. Data can be recovered if needed at any time.	Database	Firebase Database	T.3.8.5	
3.8.6	Employee's shall not spoof their location.	Server-Client	Mobile Application	T.3.8.6	
3.9.1	The Employee Tracker Application shall be available as a web application and mobile application.	Client-Server, Repository	Web Application, Mobile Application	T.3.9.1	
3.9.2	Software shall be maintained by us, the software creators.	Repository		T.3.9.2	
3.9.3	Automation of bug-detection will be in place	Client-Server, Repository, Database	Firebase Database, UI, Web/Mobile Applications	T.3.9.3	
3.9.4	Downtime must be minimal (less than 30 minutes a week during working hours), Response time to issues should be within the hour of the issue arising.	Database	Connection, Firebase Database	T.3.9.4	

II. Test Results

Description of the Actual Test Environment

Thus far, the planned testing has occurred exactly as expected for our current system. However, this is mostly due to the fact that our testing automation has not been completed as of yet. We are not currently following the Test-Driven Development model and are mostly focused on module integration.

Results of Individual Test Cases

Most of the test cases have yet to be completed as we are not currently at a stage where testing is a priority.

Test ID	Test Objective	Test Description	Test Conditions	Expected Results	Actual Results
T.3.1.1	This test will determine if the login component of the mobile application correctly allows login and prevents unsuccessful logins.	This test will input strings of a valid username, password (employ,weak@\$\$), an invalid username, password (employ333, any\$#1s), and an valid username, invalid password (employ, wrong\$\$) into the login page of the mobile application. A uid will be returned on successful login.	Mobile Application only, application must be on login page.	Case 1: App receives uid, logs user in. Case 2: App does not receive uid, instead receives 401: Forbidden HTTP response, does not log user in. Case 3: App does not receive uid, instead receives 401: Forbidden HTTP response, does not log user in.	N/A
T.3.1.1. 2	This test will determine if the mobile application correctly sends an updated GPS location periodically	After login and tracking have begun on a test phone, actual gps location of phone sent back to the database will be compared for accuracy and compliance. A GPS location will be returned periodically for a successful test run.	Mobile Application, Firebase Database	Database receives location data after user login at a regular interval.	N/A
T.3.1.2	This test will determine if the web application correctly shows a list of employees, as well as their locations on a map	For the list, the test will pull the list of employees from	Web application, after build before deployment to firebase.	The unit test returns a "Pass" and the employees coordinates match with the coordinates on the map.	N/A

the employees correctly by comparing the location in the database to the location on the map. T.3.1.3 This test will determine if the applications correctly accept valid password invalid username, password (employ,weak@\$1\$), an invalid username, password (employ,333, atstandard, and deny invalid/nonconfor ming ones. T.3.1.4 This test will login. The standard is the password must have a lowercase letter, a number, and a symbol will continue to collect gps coordinates for a maximum of 30 minutes on data/connection loss. T.3.1.4 This test will begin and tracking has been reached, the user will be logged out. T.3.1.5 the employees correctly by comparing the location on the map. T.3.1.6 This test will addermine if the mobile application. T.3.1.7 This test will determine if the mobile application begin and once the maximum time limit of 30 minutes on disaconnection will continue to collect gps coordinates for a maximum time limit of 30 minutes on disaconnection the begin and once the maximum time limit of 30 minutes on disconnection will be logged out. T.3.1.4 This test will begin and tracking has been reached, the user will be logged out.			the employees comments by			
T.3.1.3 This test will determine if the application or the map. This test will opasword (employ,weak@\$1\$), an invalid username, password (employ,weak@\$1\$), and an valid username, invalid username, invalid username, invalid password (employ, wrongpa\$\$) into the login page of the mobile application. A uid will be returned on successful login. The standard is the password must have a lowercase letter, a number, and a symbol T.3.1.4 This test will determine if the mobile application will continue to collect gps coordinates for a maximum of 30 minutes on data/connection loss. ### Connection to the database will be out off and the phone will continue storing location data in a local minutes on data/connection to the loss of connection, will beign and once the maximum time limit of 30 minutes has been reached, ### Connection on the map. ### Mobile and The application. web accept passwords that conform to the rules, otherwise they deny them. ### Mobile and The application. ### Mobile After disconnection from the database the test phone local cache will begin locally storing location data. User will be logged out on Mobile application after greater than 30 minutes of disconnection from database.						
T.3.1.3 This test will determine if the applications correctly accept valid passwords that conform to a standard, and deny invalid/nonconfor ming ones. T.3.1.4 This test will This test will orgin and racking has mobile application will continue to collect gps coordinates for a maximum of 30 minutes on data/connection loss. In this test will open and reacking has begin and to cache. A timer triggered by the loss of connection, will being and once the maximum time limit of 30 minutes on data/connection form minutes on dimutes has been reached, invalid username, password (employ, wrongpa\$\$) into the login page of the mobile application. A uid will be returned on successful login. The standard is the password must have a lowercase letter, a number, and a symbol T.3.1.4 This test will decir minutes of disconnection the loss of connection, will be cut off and the phone will continue storing location data in a local cache. A timer triggered by the loss of connection, will begin and once the maximum time limit of 30 minutes of disconnection from database.						
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correctly accept valid passwords that conform to a standard, and deny username, invalid username, password (employ333, any\$#1s), and an valid username, invalid username, invalid username, invalid username, invalid username, invalid username, invalid password (employ, wrongpa\$\$) into the login page of the mobile application. A uid will be returned on successful login. The standard is the password must have a lowercase letter, a number, and a symbol T.3.1.4 This test will determine if the mobile application will continue to connection to the database collect gps will be cut off and the coordinates for a maximum of 30 minutes on data/connection loss. We maximum time limit of 30 minutes has been reached, invalid username, rules, otherwise they deny them.		determine if the	a valid username,		• •	
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invalid/nonconfor ming ones. password (employ, wrongpa\$\$) into the login page of the mobile application. A uid will be returned on successful login. The standard is the password must have a lowercase letter, a number, and a symbol determine if the mobile application will continue to connection to the database collect gps collect gps will be cut off and the coordinates for a maximum of 30 minutes on data/connection loss. Invalid/nonconfor wrongpa\$\$) into the login page of the mobile application. A uid will be returned on successful login. The standard is the password must have a lowercase letter, a number, and a symbol owercase letter, a number, and a symbol open and tracking has begun on a test phone. The login and tracking has begun on a test phone. The connection to the database will begun on a test phone to the database cache will begin locally storing location data. User will be logged out on Mobile application after greater than 30 minutes of disconnection from database.		standard, and	any\$#1s), and an valid			
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T.3.1.4 This test will determine if the mobile application will continue to coordinates for a maximum of 30 minutes on data/connection data/connection loss. Database Datab			login. The standard is the			
T.3.1.4 This test will determine if the mobile application will continue to coordinates for a maximum of 30 minutes on data/connection data/connection to begin and once the maximum time limit of 30 minutes has been reached, The test will begin after login after login after will begin after after determine if the mobile application after determine if the login and tracking has begin after promote after determine if the login and tracking has begin after promote after determine if the login and tracking has begin after determine if the login and tracking has begin after database the test phone local cache will begin locally storing location data. User will be logged out on Mobile application after greater than 30 minutes of disconnection from database.			password must have a			
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mobile application will continue to connection to the database collect gps will be cut off and the coordinates for a maximum of 30 location data in a local minutes on data/connection to the database locally storing location data. User will be logged out on Cache. A timer triggered by data/connection the loss of connection, will begin and once the maximum time limit of 30 minutes has been reached,	T.3.1.4	This test will	The test will begin after	Mobile	After disconnection	N/A
will continue to connection to the database collect gps will be cut off and the phone will continue storing maximum of 30 location data in a local minutes on cache. A timer triggered by data/connection loss. begin and once the maximum time limit of 30 minutes has been reached, begin and once the minutes of disconnection from database. Cache will begin locally storing location data. User will be logged out on Mobile application after greater than 30 minutes of disconnection from database.		determine if the	login and tracking has	Application,	from the database	
collect gps will be cut off and the coordinates for a phone will continue storing location data. User will be logged out on minutes on data/connection loss. will be cut off and the locally storing location data. User will be logged out on Mobile application after greater than 30 begin and once the maximum time limit of 30 minutes has been reached, database.		mobile application	begun on a test phone. The	Firebase	the test phone local	
coordinates for a phone will continue storing maximum of 30 location data in a local will be logged out on minutes on cache. A timer triggered by data/connection the loss of connection, will loss. begin and once the maximum time limit of 30 minutes has been reached,		will continue to	connection to the database	Database	cache will begin	
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minutes on cache. A timer triggered by data/connection the loss of connection, will loss. begin and once the maximum time limit of 30 minutes has been reached, Mobile application after greater than 30 minutes of disconnection from database.		coordinates for a	phone will continue storing		location data. User	
minutes on cache. A timer triggered by data/connection the loss of connection, will loss. begin and once the maximum time limit of 30 minutes has been reached, Mobile application after greater than 30 minutes of disconnection from database.		maximum of 30	location data in a local		will be logged out on	
data/connection the loss of connection, will loss. begin and once the maximum time limit of 30 minutes has been reached, database. after greater than 30 minutes of disconnection from database.		minutes on	cache. A timer triggered by			
loss. begin and once the maximum time limit of 30 disconnection from minutes has been reached, database.		data/connection	the loss of connection, will		* *	
maximum time limit of 30 disconnection from minutes has been reached, database.			begin and once the		minutes of	
			•		disconnection from	
the user will be logged out.			minutes has been reached,		database.	
			the user will be logged out.			

	I			Ι.	1.1.4
T.3.1.5	This test will	This test will disable data		A error message	N/A
	determine the	transfer to the firebase	be run in the	"Connection/camer	
	success of the		mobile	a/gps failure" is	
	1	timer at the time of	application,	generated, and if a	
	• •	disconnect. If there is no	both	connection is	
	mobile application	connection within 30	emulator and	present, then the	
	fails to connect for	minutes, the employee will	a physical	userMessage field	
	30 minutes,	be forcibly logged out. This	device before	of the respective	
	camera, or gps	test will also trigger a	building.	employee's	
	fails, an alert will	controlled camera failure		database in the	
	be generated.	and gps failure. The test		server now contains	
		will ensure that a text		that same	
		notification of		message.	
		"Connection/camera/gps			
		failure" to the employee. If			
		a connection is present, the			
		message also get sent to			
		the database.			
T.3.1.6	This test will	The test will begin after login	Mobile	After disconnection	N/A
	determine if the	and tracking has begun on a	Application,	from the database	
	mobile application	test phone. The connection to	Firebase	the test phone local	
	correctly sends GPS	the database will be cut off	Database	cache will begin	
	locations collected	and the phone will continue		locally storing	
	when disconnected	storing location data in a local		location data. Upon	
	from the internet,	cache. After a time less than		reconnection, phone	
	upon successful	30 minutes but greater than		sends locally cached	
	reconnection.	two location update periods,		location data, along	
		connection will be		with new updated	
		reestablished with the		location data	
		database and locally cached		periodically.	
		location data will be sent to		,	
		the database along with new			
		updated positions.			
T.3.2.1	This test will	This test will input strings of	Mobile and	Case 1: App receives	N/A
	determine if the	a valid username,	Web	uid, logs user in.	
	mobile application	password	application,	Case 2: App does not	
	correctly passes	(employ,weak@\$1\$), an	and Firebase	receive uid, instead	
	inputted	invalid username,	for	receives 401:	
	credentials to	password (employ333,	authentication	Forbidden HTTP	
	firebase, and	any\$#1s), and an valid		response, does not	
	firebase then	username, invalid		log user in.	
	correctly verifies	password (employ,		Case 3: App does not	
	the employee.	wrongpa\$\$) into the login		receive uid, instead	
L				. coche dia, moteda	

		page of the mobile		receives 401:	
		application. A uid will be		Forbidden HTTP	
		returned on successful		response, does not	
		login.		log user in.	
T.3.2.2	This test will	This test will read all	The mobile	The connections	N/A
1.3.2.2				are valid REST	IN/A
	determine if the	connections to the	application,		
	mobile application	database for a period of 10	after building	requests. The test	
	correctly interfaces	minutes. It will then attempt		then will return a	
	with the firebase	to parse them as REST		"Pass" message.	
	database through	requests.			
	RESTful requests.				
T.3.2.3	This test	After login and tracking has	Mobile		
	determines that	begun on a test phone, actual	Application,		
	the precision of the	gps location of phone sent	Firebase		
	GPS locations is 6	back to the database will be	Database	Database receives	
	decimal places, and	compared for accuracy and		6-digit decimal	
	that it gets sent to	precision of 6 decimal places.		precision location	
	the firebase	A GPS location will be		data after user login	
	database	returned periodically for a		at a regular interval	
	periodically.	successful test run.		and is returned.	N/A
T.3.2.4	This test will	This test will read all	The mobile	The connections	N/A
	determine if the	connections to the	application,	are valid REST	
	web application	database for a period of 10	after building	requests. The test	
	correctly interfaces	minutes. It will then attempt		then will return a	
	with the firebase	to parse them as REST		"Pass" message.	
	database through	requests.			
	RESTful requests.				
T.3.4.1	This test will	This test is purely	The Mobile,	There are three	N/A
	determine if there	observational from the	Web	individual	
	are three groups	developer view. If there are	application,	groups/classes	
	available to be	three classes that	and the	implemented.	
	logged in.	represent Employer,	Firebase		
		Employee, Admin, then the	database		
		test passes.			
T.3.4.3	This test will verify	For this test, a logged in	A employee	A 401: Forbidden	N/A
	that Employees do	Employee should not have	is logged in	HTTP response.	
	not have access to	access to "add/remove	via the		
	Employer	employee" that the	mobile		
	permissions and	Employer has. A POST	application		
	vice versa.	request containing the			
		method updateEmployee()			
		will be sent from the mobile			

T.3.4.4	This test will verify that a training manual is provided.	application. If it returns anything but an 401 Forbidden error, the test will fail. This is another observation test. At the time of client implementation, a training manual is provided. If the manual is not provided, the test fails.	The client chooses to implement the software system	A training manual is provided	N/A
T.3.5.1	been updated when the software updates.	code and the manual. If no commits to the manual occur within 10 code commits, the test fails.	ory system is in use	The commits to the manual should occur within every 10 code commits. If not, the test fails.	N/A
T.3.5.2	This test will verify that the documentation has images and diagrams.	This test will grep the documentation file for any image extensions. It will also verify that those referenced image files exist in the referenced directory	be run when we build the applications.	Image extensions with existing referenced files will exist, resulting in a "Pass" from the test.	N/A
T.3.5.3	This test will verify that the documentation is concise.	This test will compare the word count of the documentation to the number 15000. This number comes from the average of 300-350 words per page, and the maximum page length we set as 50 pages.	During after build time of mobile and web applications.	The test returns "Pass" if the word count is less than 15000.	N/A
T.3.5.4	This test will verify that the documentation is presented in layman's terms, no jargon in it.	This is an observational test. This test involves us (the developers) reading through the documentation and ensuring that there is no complex technical terms.	After final build of applications, before publishing work.	There are no technical terms involved in the documentation.	N/A

T.3.5.5	This test will verify that all interactable portions of the software are documented with explanations.	Another observational test. This involves us (the developers) going through the documentation and ensuring that every time we have a updated render() in the code, there is a corresponding description in the documentation.	After final build of applications, before publishing work.	There is a corresponding description of every render() update in the code to a paragraph in the documentation.	N/A
T.3.6.1	of GPS precision is correctly 6 decimal	After login and tracking has begun on a test phone, actual gps location of phone sent back to the database will be compared for accuracy and precision of 6 decimal places. Location data will be compared on phone and from database to actual latitude and longitude coordinates. Matching longitude and latitude from phone, Map View, and database will provide a successful test run.	Application, Firebase Database	6 digit longitude and latitude location data sent from phone will match 6 digit longitude and latitude data on database and Map view. This will be in format (28.6024 N, 81.2001 W)	N/A
T.3.6.2	This test will determine if GPS coordinates in the form of latitude and longitude for each individual employee are successfully retained in the database.	User will login to test phone and begin GPS tracking. A successful run will consist of correct data being logged in database.	Mobile Application, Firebase Database	Location data from mobile phone will be correctly logged in Firebase database.	N/A
T.3.6.3	This test will determine if the employee's name and unique ID are retained together in the firebase database.	Using our own dummy data of the six of us will allow us to automate this and quickly discover whether or not the test cases are off. This test will iterate through all location entries in the database, and ensure that	Firebase database test with string comparisons of our own information.	Each employee has a unique ID assigned to them in the database. A result of "Pass" is generated on success.	N/A

		each employeeName had a corresponding unique ID.			
T.3.6.4	This test will determine if the date and time of the gathered GPS coordinates are retained alongside the rest of the gathered data in the database.	This test will iterate through all location entries in the database, and ensure that each location entry had a corresponding timestamp in ISO format	Database connection, when database is filled with dummy data.	Each location has a corresponding timestamp. A result of "Pass" if this is true. Otherwise, "Fail"	N/A
T.3.6.5	This test will determine if all logins are successfully logged in the database.	Multiple correct and incorrect logins will be conducted on the Web and Mobile applications, and data will be sent to the database. Database will then be checked against login attempts for corresponding data.	Mobile, Web application, Firebase for data logging	Case 1: User logs in, data is logged correctly in database. Case 2: User attempts to log in using incorrect information, database logs incorrect attempt with corresponding data.	N/A
T.3.7.1	This test will determine that the database will provide long lasting storage for the information gathered.	Documentation will be reviewed to show that our version of our database is stable and provides longevity.	Periodic installs of our backups on test servers to ensure backups are working correctly	Test server with backup successfully passes all automated testing.	N/A
T.3.7.2	This test will verify that a system administrator has access to the firebase database and can debug.	Observational Test. One or more intentional bugs to ensure proper response.	Mobile Application, Web Application, Firebase Database	All intentional bugs (viewed only by developers) are viewable.	N/A
T.3.7.3	This test will verify that the Employer utilizing this software will provide the	Peer Review System. This will be a user response test in which we provide a way to give feedback to us to ensure the safety and privacy of our	Mobile Application, Web Application	Periodic automated tests on the feedback system to ensure developers are receiving feedback by	N/A

	employees with all necessary technology.	users.		its users.	
T.3.8.1	This test will determine if access to the system is successfully controlled and secured by logins for each client.	Ensures only the correct user is viewing information they are allowed to view and nothing else. The test will ensure that the login for a employee only retrieves data for that employee, and no one else. This will be done by comparing the information returned on login to the login status of the employee in the database.	Mobile Application, Web Application, Firebase Database	Case 1: URL testing of what might allow a view of another user. Case 2: Validating users in the database are not connected to other users' information.	N/A
T.3.8.2	This test will determine if the client's data is successfully isolated from other clients through logins.	We are ensuring the user can only log in to their own accounts.	Mobile Application, Web Application, Firebase Database	Same as T.3.8.1	N/A
T.3.8.3	This test will verify that the client's data is encrypted with the AES 256-bit standard.	Implementation can be seen within the firebase data. Observation.	Firebase Database	We will have a dummy row of a user in the database and will string check known values with the database to ensure none match, if so, then the encryption is not occurring.	N/A
T.3.8.4	This test will determine if the database is hardened against SQL injection attacks.	A couple standard attempts in user input fields to ensure that the sql fails to be injected.	Mobile Application, Web Application	There are many testing suites to test this, which will be implemented, which could include oWasp or sqlmap	N/A

T.3.8.5	This test will determine if the system is successfully backed up, and is backed up periodically.	During start up of the system, we will make a backup and rerun the application to ensure that the backups are in fact working and then periodically check on whether firebase is still making backups.	Firebase Database, Mobile and Web Application	All automated and observational testing works on the live backup environment.	N/A
T.3.8.6	This test will verify that the employee using the web application is unable to spoof their location.	We will test current applications that allow gps spoofing and check whether the system is aware of the spoofing. The test will also tie into Android's SafetyNet and Apple's equivalent security system. If the test detects root or jailbreak privileges, or that developer settings are enabled and thus location spoofing, the app will generate an alert message and send it to the database. There is also observational testing, where the Employer ensures to provide the employees with locked down devices.	Mobile Application. Firebase Database, after building before deploying.	Our testing will be more hands on, using sqlmap as well as other applications to spoof our own location and determine whether or not the system is aware.	N/A
T.3.9.1	This test will determine if the Employee Tracker software is available as a web and mobile application.	Observation and Administration testing will test this.	Mobile and Web Application. Firebase Database,	All automated testing and observational testing will must be passed to ensure both applications are up and running.	N/A
T.3.9.2	This test will verify that the software is maintained by the people in Group 6: Employee Tracker,	Observation. GitHub allows users to see who is editing and when it has occurred.	Github, git log.	Observation will show whether or not updates have been made as and the whole team is	Ryan Hoeck, 2017-11-20, Pass.

	in class COP-4331			developing the	
	during the Fall 2017			product.	
	Semester.				
T.3.9.3	This test will verify	Other than observational	Debug logs	This will be	N/A
	that the testing	testing, we will be able to	within our	observational. We	
	suite is automated.	run scripts that run	applications	will check the debug	
		automatically and print in a		logs for any	
		debug log of any errors that		detrimental activity	
		could have occurred.		and react	
				accordingly.	
T.3.9.4	This test will	Peer Review System. Half	Backup	Bringing down and	N/A
	determine if the	of our team can startup a	system of the	bringing back up the	
	downtime and	development system and	whole	whole system and a	
	response time is	ensure that the response is	application	full run of the test	
	within the	valid and acceptable	and database.	suite to acquire data	
	acceptable range.	according to the		for the efficiency and	
		specifications.		the downtime during	
				the process.	

Req ID	Requirement Description	Architecture Reference	Design Reference (component/modu le)	Test Case Reference	Status
3.1.1	The Employee Tracker shall allow the Employee to log in, update location, and see other users using the mobile application	Employee Login, Tracking status	Login < <interface>>, Mobile Application</interface>	T.3.1.1	F
3.1.2	The Employee Tracker shall allow the Manager to see updates from the employee on the web application.	Employer Login, Select Any Employee	View, Web Application	T.3.1.2	F
3.1.3	,	Employee Login, Customer Login	Connection, Firebase Database	T.3.1.3	F
3.1.4	The mobile application will continue running and collecting location coordinates for up to 30 minutes if loss of internet connectivity occurs. After 30 minutes, the system alerts both the user and the employer that the device has not had a connection for 30+	Checks Tracking status, Employees Have Location turned on.	Connection, Mobile Application	T.3.1.4	F

	minutes.				
3.1.5	The mobile application will notify the user and the employer if the mobile device's GPS or camera malfunctions.	Clicks Employee Details, Turns Tracking on/off, Makes changes to the database information.	Web application, Mobile application	T.3.1.5	F
3.1.6	The mobile application will send the locally stored locations to the server upon successful reconnection.	Makes changes to the Database Information.	Mobile Application	T.3.1.6	F
3.2.1	The Employee Tracker application shall check username and password for each user login. The username and password inputs will be sent as strings to be checked and be validated with Firebase. The data must be exact as it is credentials for a user.	Employee Logs in, Customer Logs in	Connection, Firebase Database	T.3.2.1	F
3.2.2	The Employee Tracker application shall fetch, the (fetch method), and post requests to and from Firebase to validate against the frontend that what the user input has integrity.	Retrieves Database Information, Makes changes to Database Information,	Connection	T.3.2.2	P
3.2.3	Upon successful login, the mobile application shall send its location with 6 points of precision to the server immediately, and every 10 minutes thereafter, for the duration the user is logged in, or until a period of 30 minutes of no connectivity to the server passes.	Check Tracking Status, Makes Changes to database Information	Mobile Applications Location	T.3.2.3	F
3.2.4	All data transfers between the Firebase server and the web or mobile application shall be through a RESTful API.	Database, Retrieves Database Information.	Connection	T.3.2.4	P
3.4.1	The Employee Tracker Application shall have these 3 user groups: The Employer, Employee, and Admin.	Employee, Customer, Admin	Web application, Mobile Application, Firebase Database	T.3.4.1	Р
3.4.3	The Employee Tracking App shall prevent misuse by the user groups	Turns tracking on off, makes changes to database information.	Connection, Login, Mobile application	T.3.4.3	F

2.4.4	Upono abali be muonide di traticio e col	Databasa	Da auma amtatia ia	T 2 4 4	T _D
3.4.4	Users shall be provided training and	Database,	Documentation	T.3.4.4	P
	copies of the Employee Tracking	Client-Server			
	Application manual, thus minimal				
	knowledge of the system is required.				
	The only ability required is being able				
	to follow a procedure outlined in the				
	manual, and being able to read at				
	smallest an 11pt font.				
3.5.1	The documentation shall be stored	Documentation	Documentation	T.3.5.1	Р
	with the software and updated in				
	accordance to functional changes of				
	the software.				
3.5.2	The documentation will have pictures	Documentation	Documentation	T.3.5.2	F
	and diagrams of the software, with				
	footnotes explaining what each button				
	does.				
3.5.3	The documentation should be concise	Documentation	Documentation	T.3.5.3	Р
	and not span hundreds of pages.				
3.5.4	The documentation shall have no	Documentation	Documentation	T.3.5.4	Р
	usage of legalese or other complicated				
	technical terms or jargon that would				
	confuse a user.				
3.5.5	The documentation should explain all	Documentation	Documentation	T.3.5.5	F
	parts of the software the user can				
	interact with.				
3.6.1	The degree of GPS precision shall	Database, Retrieves	Documentation	T.3.6.1	F
	be 6 decimal places for latitude and	Database			
	longitude. For example, (28.6024	Information			
	N, 81.2001 W) which are the GPS				
	coordinates for the University of				
	Central Florida. The accuracy of the				
	GPS data will vary depending				
	location, weather and the number				
	of satellites in line of sight to the				
	GPS hardware on the mobile				
	device. The Google Maps API will				
	be used to facilitate this				
	requirement.				
3.6.2	GPS coordinates in the form of latitude	Database, Retrieves	Firebase Database,	T.3.6.2	F
3.0.2	and longitude for each individual	Database, Netrieves	Algorithm	1.0.0.2	[
	employee must be retained in the	Information	, "601111111		
	database.	Intormation			
	uatabase.				

2.6.2	The amendment of the second of	Databar Add	Databass	T 0 0 0	1-
3.6.3	The employee's name and unique ID	Database, Make	Database	T.3.6.3	F
	will need to be retained together in	changes to the			
	the database.	database.			
3.6.4	The date and time of the gathered GPS	Database	Database, User,	T.3.6.4	F
	coordinates shall be retained				
	alongside the rest of the gathered data				
	in the database.				
3.6.5	Logins shall be retained in the	Client-Server,	Database, Login	T.3.6.5	F
	database.	Repository			
3.7.1	A database shall be required for the	Database	Firebase Database	T.3.7.1	Р
	backend to provide long term storage				
	for our client's data. As our client's				
	grow in number the costs associated				
	with the Firebase database platform				
	we chose will grow as well.				
3.7.2	A database administrator(s) will be	Database	Firebase Database	T.3.7.2	Р
	needed to perform maintenance on				
	the system as required. The system				
	may need to be debugged at times and				
	this action will require skilled				
	personnel.				
3.7.3	The Employee Tracker application shall	Subscriber	Web Application,	T.3.7.3	Р
	require the client to have access to		Database		
	computers and the client's employees				
	to have access to mobile devices. We				
	will not need to provide any hardware				
	to the clients for the application to				
	function as intended. In addition, we				
	will not require physical space or				
	supporting amenities as the client's				
	business will cover those aspects of				
	their operation.				
3.8.1	Access to the system shall be	Server-Client	Firebase Database	T.3.8.1	P
3.8.1		Server-Chefft	rii enase Dalanase	1.3.0.1	ľ
	controlled and secured by logins for				
2.0.2	each client.	Campan Clinat	Final and Dutation	T 2 0 0	
3.8.2	Client's data shall be isolated from	Server-Client	Firebase Database	T.3.8.2	P
	other clients through logins.				
3.8.3	Client's data shall be encrypted with	Database	Firebase Database	T.3.8.3	F
	256-bit AES standard				
3.8.4	Database shall be tested against SQL	Database	Firebase Database	T.3.8.4	Р
	injection				

3.8.5	Automatic backups shall be performed	Database	Firebase Database	T.3.8.5	F
	once per day offsite (Firebase cost				
	dependent). Backups are off site on				
	Google's servers and protected from				
	water, fire and other natural disasters.				
	Data can be recovered if needed at				
	any time.				
3.8.6	Employee's shall not spoof their	Server-Client	Mobile Application	T.3.8.6	F
	location.				
3.9.1	The Employee Tracker Application	Client-Server,	Web Application,	T.3.9.1	F
	shall be available as a web application	Repository	Mobile Application		
	and mobile application.				
3.9.2	Software shall be maintained by us,	Repository	Employee Tracker	T.3.9.2	Р
	the software creators.				
3.9.3	Automation of bug-detection will be in	Client-Server,	Firebase Database,	T.3.9.3	F
	place	Repository,	UI, Web/Mobile		
		Database	Applications		
3.9.4	Downtime must be minimal (less than	Database	Connection,	T.3.9.4	F
	30 minutes a week during working		Firebase Database		
	hours), Response time to issues should				
	be within the hour of the issue arising.				

Conclusion

The system has not been finished so it is hard to give a final conclusion on the product, but what can be said is that the product needs some work still. Testing will definitely be required throughout more of our development and reviewing our table of tests-to-be-done, it seems as though more testing is unnecessary. We are on a projected path to be done on time, so the product cannot be currently delivered. Maintenance will not be an issue as the system is fairly simple so any complications can be quickly addressed.

As to what remains to be done, we are currently working on the Google Maps API as well as the functionality for GPS tracking since they are one in the same. We also need to implement our automated testing to ensure structure and reliability of our system to the customer. Our development environment and our Firebase server are well under way and supply a solid foundation for us to efficiently finish the rest of what needs to be done.