SENG 696 (Agent Based Software Engineering)

University of Calgary

Research Matchmaking

Project – 1B (Design Document)

Submitted To: Dr. Behrouz Far   **Submitted By**: Sanyam (30118797)

Mingrui Yu (30125930)

Jasneet Kaur Chahal (30119845)

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Introduction

The team has decided to work on the sample project "Research Matchmaking" as given on D2L. The team will implement all the specifications. The specifications are also submitted along with this document as "SystemSpecification1A_ResearchMatchmaking".

A multi agent system will be implemented using the concepts of agent-based software engineering. This document entails the analysis and design phase of the research matchmaking system using GAIA methodology. Five models i.e., Roles Model, Interactions Model, Agent Model, Services Model, and Acquaintances Model are developed as specified by the GAIA methodology.

Description

Research matchmaking will help the clients and providers to connect on a single platform and will help them in signing the contracts for the projects. Apart from the client and provider, user can simply visit as a guest as well, and can check all the providers. However, not all the information will be displayed to the guest. Different types of users will have different permissions and will have access to the different functionality.

Several types of graphical user interfaces (GUI) will be developed for the separate user groups. A mock database will be created where the system will store the data and will access it for completing its operations. All the basic operations will be initiated from the GUI's. Detailed specifications are attached along with the "SystemSpecification1A_ResearchMatchmaking" document and design of the system is discussed in the below sections.

Roles Model

Role Schema	Graphical User Interface (GUI)	Signup Handler	Login Handler
Description	Acts as a user interface between the client and the system.	Registers the user as a provider or as a client based on the user request.	Check if the user is a provider, client, or guest. Also, check the login details of the provider and the client.
Protocols and Activities	Displays the information, get the user response.	Get request from User, read user data, register the user.	Get the user data, read the data from the database, verify the data, and provide the required access.
Permissions	Displays the information. Read the data. Send the data to other components of the system.	reads supplied User User Data. write User Data in database.	Reads supplied user Data. Reads supplied database Data. Verify the user.

				Provide required access.
Responsibilities	**Liveness**	Showing GUI for provider and client. User Interface = (Display. Read. Send)	Login = (get, read, verify, provide).	Login = (get, read, verify, provide).
	Safety	Successfully show everything needed in the system.	Properly verify all the information. Provide only required access.	Properly verify all the information. Provide only required access.

Role Schema		Verifier	Bid Handler	Sort Handler
Description		Verifies the proof of business provided by providers and then accepts the request and issues a verified icon if every piece of information provided by them is correct.	Accepts the request from the Client for placing a bid and handles the process of rejecting or accepting the bid.	Sorts out the list of providers based on keywords.
Protocols and Activities		Get proof of business, check the information, accept the request, and issue a verified icon.	Wait for the request, Accepts the request for the bid, Send the bid to provider, get acceptance/Rejection from provider, based on acceptance/rejection convey to client or System.	Get the keywords, get the list of providers, sort out the list based on keywords, and output the sorted list.
Permissions		Read supplied Provider Proof of business. Issue verified icon.	reads supplied GUI bid. Write the bid to provider.	read keywords access to list of providers.
Responsibilities	**Liveness**	Verification = (Get. Check. Accept/Reject. Issue Icon.)	HandleBidProcess = (Wait. Request. Send. Accept Response. Act.)	Sorting = (Get keywords. get providers. Sort. Output)
	Safety	Reads the correct data and run proper checks.	Ensure the acceptance goes to the system first and the rejection goes to the client.	Safely show the information of all the sorted providers.

Role Schema		Plan Handler	Contract Handler	Payment Handler
Description		Displays the Basic and Premium plans only to the providers.	Sends the contract to the Provider as they sign up and checks if the provider accepts it or not. Also, sends the contract to the provider and client on the creation of the new project.	Handle money transactions. Pay the provider after deducting 30 percent of the transaction amount.
Protocols and Activities		Check if user is Provider, display plans, and subscribe the provider to the selected plan.	Gets the request, sends the contract to the provider, and checks if they accept it or reject it.	Request the client for the payment, Receives the payment from the client, deduct 30 percent amount and pay the provider.
Permissions		Read user data. Write plans.	read supplied user request. write contract.	Read provider bank details.
Responsibilities	Liveness	Display Plan = (Check. Display. Receives Request. Subscribe)	ContractGeneration = (Get Request. Send. Check).	Transaction = (Request. Receives. Deduct. Pay)
	Safety	Show the plans only to the providers.	Sending the correct contract.	Ensure that the provider receives the dedicated amount.

Role Schema		Project Tracker	Change Handler	Feedback Handler
Description		Tracks the progress of the project. It shows the tentative deadline, progress so far, and estimated time of completion based on the current pace.	Handles the request of changing the project after its beginning.	After completion of the project receive feedback from the client and the provider and write it in the database.
Protocols and Activities		Tracks the progress of the project. Displays the progress, and estimated time of completion.	Change request from the client, approval from provider, and change in project.	Request feedback from client and provider after completion of the project. Get feedback. Write it in the database.
Permissions		Read supplied project handler Project data. Write to the tracking page.	Reads supplied User Project Data. Write to the provider.	Read supplied user Feedback data. Write in database.
Responsibilities	Liveness	Project Tracking = (Track. Display)	Change Project = (Change Request. Approval. Change)	Get Feedback = (Request Feedback. Write)

	Safety	Successfully showing the progress on the tracking page.	Successfully changing the project after approval.	Make sure that project is done. Write successfully in database.

Role Schema		Project Handler	Chat Handler
Description		Creates the project after the contract has been signed by both client and provider.	Creates the chat after the contract has been signed by both client and provider.
Protocols and Activities		Get approval request from Client, get approval request from provider, creates the project.	Creates the chat, reads the messages from the users, and displays them on the chat.
Permissions		Create project	Create chat
Responsibilities	Liveness	Project Creation = (Get approvals. Create project)	Chat Creation = (Check approvals. Create chat)
	Safety	Successfully add the data to the project.	Check if the project has been accepted by both the client and provider.

Interaction Model

Protocol	Signing In	Logging In	Proof verification request
Purpose/Parameters	Registration request for registering the new user as a client or as a provider. The request includes the username and the password.	Logging request for logging the user as the client or provider. The request includes the username and the password.	Request for verified icon. The request includes the proof of business.
Initiator(s)	Graphical User Interface	Graphical User Interface	Graphical User Interface
Receiver	Signup Handler	Login Handler	Verifier
Processing	The GUI gets the information from the user and passes to the Signup Handler to perform the operation.	The GUI gets the information from the user and passes to the Login Handler to perform the operation.	The GUI allows the user to input proof of business and sends it to the Verifier for the verification purpose.

Protocol	Bidding request	Bidding Approval Request	Bidding Reject Request
Purpose/Parameters	Bidding request by the client for a particular	Acceptance of the bid by the provider. The	The provider rejects the bid request. The request

	provider. The request includes the information about the provider.	request includes the information about the bid and its acceptance.	includes the information about the bid and its rejection.
Initiator(s)	Graphical User Interface	Graphical User Interface	Graphical User Interface (Provider)
Receiver	Bid Handler	Bid Handler	Graphical User Interface (Client)
Processing	The GUI gets the information from the client about the bid and passes to the Bid Handler to perform the operation.	The GUI receives and sends the acceptance to the bid handler.	The GUI receives the input from the provider and sends it to the client through GUI.

Protocol	**Provider List Request**	**Display Provider List**	**Plan Subscribe Request**
Purpose/Parameters	Request for the list of providers based on specific keywords. The request includes the information about keywords.	Request for displaying sorted list of providers on the GUI. The request includes the sorted list of the providers.	Request by the provider to subscribe to the basic or premium plan. The request includes the information about the plan to which subscriber wants to be subscribed.
Initiator(s)	Graphical User Interface	Sort Handler	Graphical User Interface
Receiver	Sort Handler	Graphical User Interface	Plan Handler
Processing	The GUI reads the list of keywords entered by user and sends it to the Sort Handler for processing.	The Sort handler sorts the list based on the keywords and sends it to the GUI for displaying.	The GUI receives the input from the provider and sends it to the plan handler.

Protocol	**Registration Confirmation Request**	**Contract Request**	**Respond Contract Request**
Purpose/Parameters	Signup Handler sends the information to the contract handler about the new provider. The request includes the information about the provider.	Sends the contract to the new provider for approval purpose.	Approval or rejection from the provider. The request includes the information if provider accepted the approval or rejected it.
Initiator(s)	Signup Handler	Contract Handler	Graphical User Interface
Receiver	Contract Handler	Graphical User Interface	Contract Handler

Processing	Signup handler retains the information about new user and waits for the approval from contract handler.	The contract handler generates the contract for the new provider.	The GUI receives the input from the provider and sends it to the Contract Handler.

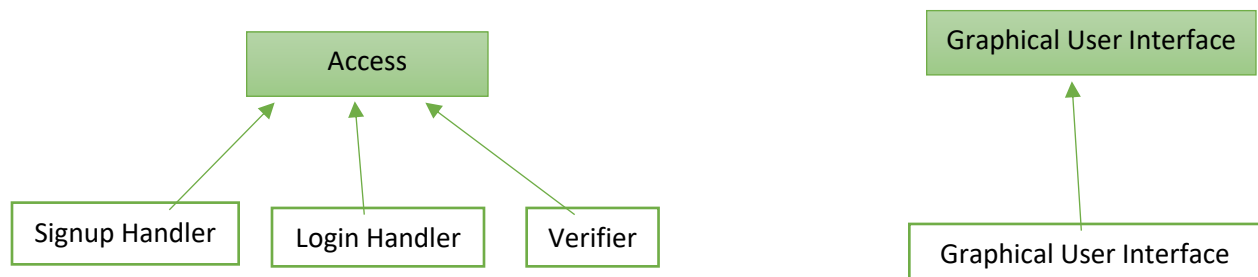| Protocol	Registration Decision Request	Status Request	Payment Request
Purpose/Parameters	Contract Handler sends the information to the signup handler about the acceptance or rejection of contract by provider.	Sends the status of the project as "complete."	Requests the client for the complete payment of the project.
Initiator(s)	Contract Handler	Project Tracker	Payment Handler
Receiver	Signup Handler	Payment Handler	GUI
Processing	Contract handler receives the information from the GUI and then sends it to the Contract Handler.	Project tracker tracks the status of the project and informs the payment handler as soon as it gets complete.	After receiving the payment from the client, deducts the 30 percent amount and pays the provider.

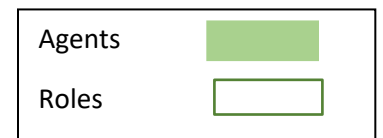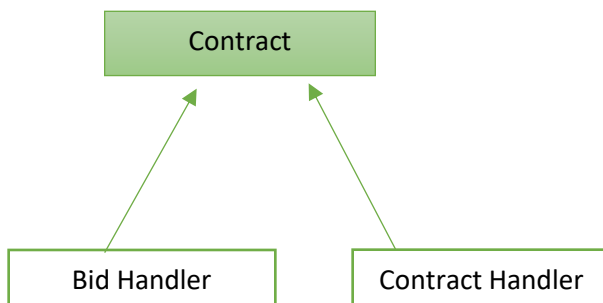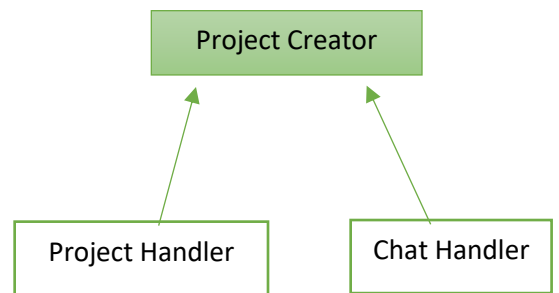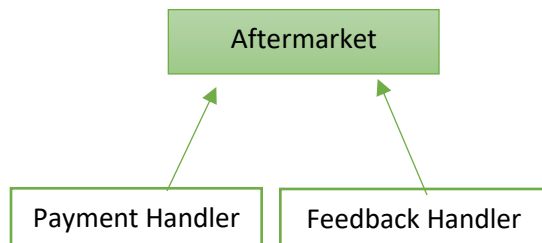| Protocol	Project Tracking	Project Change	Approved Change Request
Purpose/Parameters	Provides information about the project status.	Request to change the project. The request contains the information regarding the changes in the project.	Approved changes in the project will be sent to the project tracker. The request contains the information about the changes in project.
Initiator(s)	Project Tracker	Graphical User Interface (Client)	Change Handler
Receiver	Graphical User Interface	Graphical User Interface (Provider)	Project Tracker
Processing	Tracks the project progress and passes it to the GUI for the display.	The client GUI will receive the changes from the client.	Changes are approved by the provider.

Protocol	Feedback Request	Feedback Initiate Request	Feedback Submission

Purpose/Parameters	Request feedback from the client and the provider.	Informs the feedback handler about the completion of the project.	Submit the feedback. Submitted feedback is then stored in database by the feedback handler.
Initiator(s)	Feedback Handler	Project Tracker	Graphical User Interface
Receiver	Graphical User Interface	Feedback Handler	Feedback Handler
Processing	The project tracker needs to inform the feedback handler about project completion.	Project tracker should mark the project as complete.	User should submit the feedback in the GUI.

Protocol	Project Creation Request	Chat Creation Request	
Purpose/Parameters	Creates the project when both client and provider accept the contract. The request includes the confirmation of acceptance from client and provider.	Creates the chat once both client and provider accept the contract. The request includes the confirmation of acceptance from client and provider.	
Initiator(s)	Contract Handler	Contract Handler	
Receiver	Project Handler	Chat handler	
Processing	Contract handler should get confirmation of acceptance from both the provider and the client.	Contract handler should get confirmation of acceptance from both the provider and the client.	

Agent Model

Search ← Sort Handler

Plan Handler ← Plan Handler

Tracker ← Project Tracker, Change Handler

Aftermarket ← Payment Handler, Feedback Handler

Project Creator ← Project Handler, Chat Handler

Contract ← Bid Handler, Contract Handler

Agents
Roles
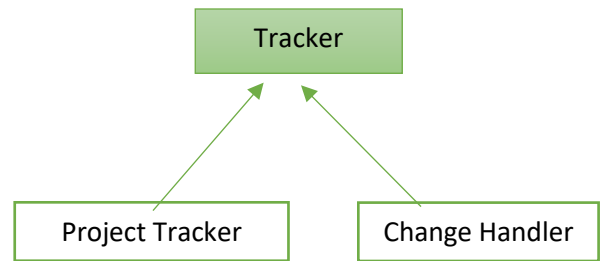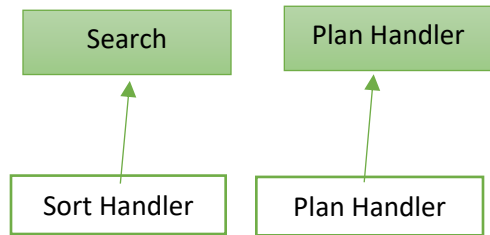
Services Model

Services Model	Login	Search (Sort)	Chat	Plan
Inputs	Login credentials of the user.	Keywords and providers list.	Gets the input of the message for Chat	Receives request from provider to get subscribed to either basic or premium plan.
Outputs	Authenticates if the user is valid or not.	Provides the list of the providers after sorting it based on the keywords.	Displays the message to the users	Subscribes the provider to the selected plan.
Pre-Conditions	User should be able to input the login credentials on graphical user interface.	Users should be able to submit the keywords via Graphical User Interface.	Creates a secure connection to chat after the contract has been signed by both client and provider.	Provider should be able to select one of the plans via GUI.
Post-Conditions	Reads the supplied user data, reads supplied database data, verifies the user, and provides required access.	Reads the key words. Access the database to get a list of providers. Sorts the list based on keywords.	Creates the connection for chat Reads the messages from the users Displays the message on the chat.	Read the user data. Write it in database and subscribe the provider to the selected plan.

Services Model	Feedback	Payment	SignUp	Graphical User Interface
Inputs	Feedback, Ratings or Comments from the user and the provider	User information about the payment model (Credit Card/Debit Card Details)	Credentials of the user.	User interacts with the system and takes input.
Outputs	Displays the feedback to the client	Checks the information and approves or declines the payment	Registration of the user as provider or client.	Graphical User interface should be displayed.
Pre-Conditions	Users should be able to enter the	Users should be able to enter the	Launches graphical user interface.	User runs the system.

	feedback information via Graphical User Interface.	payment information via Graphical User Interface.		
Post-Conditions	Read supplied user Feedback data Write in database	Receives the payment from the client Deduct 30 percent amount and pay the provider. Access the client information from Database to reflect the changes.	Reads supplied user data and stores the data in the database.	Should be able to take the input from the user.

Services Model	Verification	Bidding	Contract	Tracker
Inputs	Proof of business submitted by the user.	Bidding request from client.	Newly signed user data	Project data
Outputs	Verifies if the proof of business is valid or not.	Check if the bid is accepted or not by the provider.	Verifies if the provider will be signed up as a provider or client	Displays the project data on GUI
Pre-Conditions	Users should be able to provide the proof via Graphical User Interface.	Users should be able to submit the bid request via Graphical User Interface.	Provider should be able to sign up via GUI	Project should be signed by both the client and provider.
Post-Conditions	Read the information and verify it.	Read the bid information, send it to provider, and read the response.	Read the user data and send the contract to the provider and further verify its acceptance or rejection.	Read the project data.

Services Model	Change	Project Handler	
Inputs	Change request by user.	Approval request from client and	

		provider and project details.
Outputs	Sends the change request to provider and accepts/rejects the change.	Creates the project.
Pre-Conditions	Users should be able to provide the change request via Graphical User Interface.	Users should be able to submit the project request (bid) via Graphical User Interface.
Post-Conditions	Read the data in change request and write it to the provider.	Read the project information, send it to the provider, and read the response.

Acquaintance Model