CSE2ISD Assignment 1

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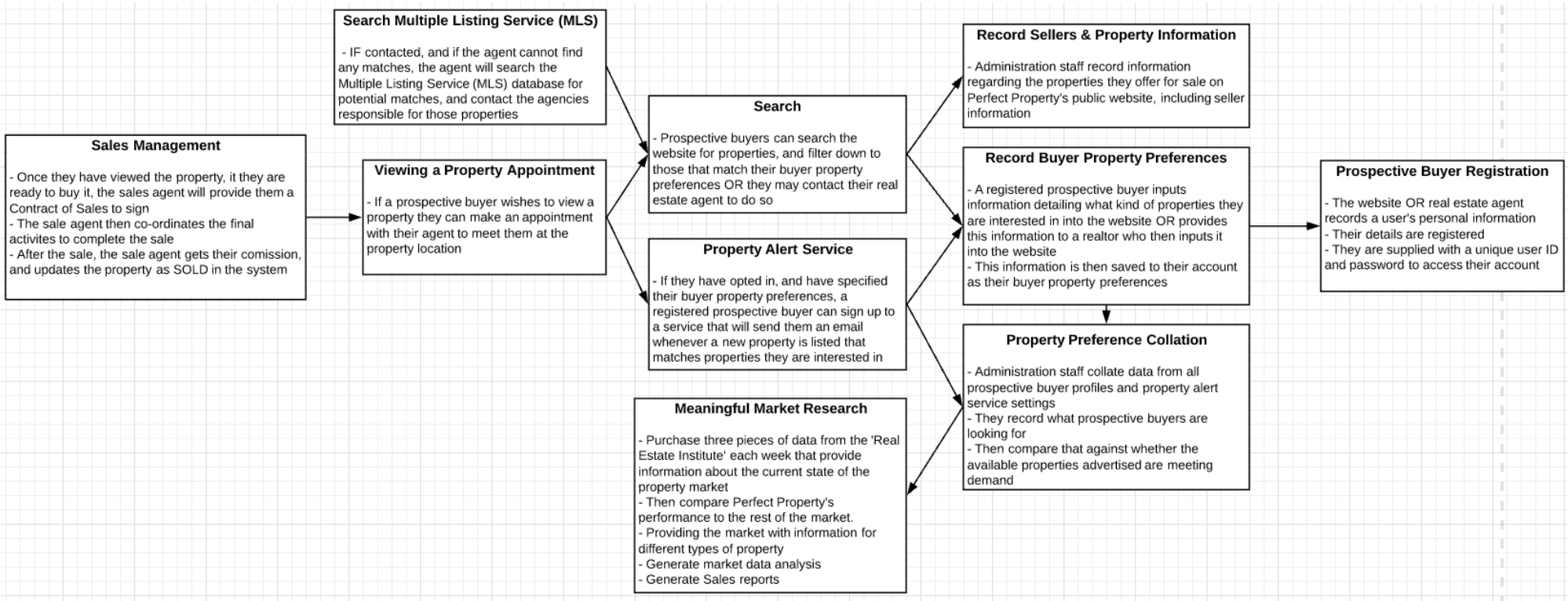
Statement of Originality: This is my own work. I have not copied any of it from anyone else.

I. Requirements Gathering [12 marks]

1. **Create an <u>owner's view</u> chart for capturing the aforementioned business narrative that you can show it to stakeholders for feedback. You can make any reasonable assumptions if the case is not clearly mentioned in some areas. [10 marks]**



2. **Identify the users of the system. List these under subheadings for business and IS users. [2 marks]**

Users: Prospective Buyer, Real Estate Agent/Realtor, Administration Staff, Sales Agent

Business users: Prospective Buyer, Real Estate Agent/Realtor, Sales Agent

Information System Users: Prospective Buyer, Real Estate Agent/Realtor, Administration Staff

II. Domain Analysis [10 marks]

3. Write domain definitions and, from there, proceed to establish the domain scope for the system and each subsystem. The following table provides a template for your answer. (Write down at least 4 domains and their scopes for the proposed system). [5 marks]

Real Estate Management	
Domain Scope	
Domain	**Scope Outline**
Web Services	All activities that directly use the web fall within this domain, including: • Search • Property Alert Service • Record Sellers & Property Information • Record Buyer Property Preferences • Prospective Buyer Registration
Estate Agent Services	All activities that an estate agent can directly handle for a prospective buyer instead of the buyer using online services fall within this domain, including: • Search (on behalf of buyer) • Search Multiple Listing Service (MLS) • Viewing a Property Appointment • Prospective Buyer Registration (while the buyer is offline) • Record Buyer Property Preferences (while the buyer is offline)
Sales Management	All activities that involve the sales agent finalizing a sale fall within this domain, including: • Presenting buyer with a Contract of Sales to sign • Serving intermediaries between the buyer and their attorney during the sale agreement • Getting homeowner insurance • Acquiring title insurance • Payment processing • Obtaining sales commissions • Instructing the IT system to update property data, web advertisement and customer information subsystems
Market Research	All activities that involve the collection, collation, comparison and creation of meaningful data fall within this domain, including: • Collation of data from all prospective buyer profiles • Collation of data from property alert settings • Comparison of data against the currently available advertised properties • Leveraging market information to assist in provided estimates of selling price ranges for properties • Weekly purchasing of 'Weekly median house/Townhouse and Unit/Apartment prices by suburb'; 'Weekly median Land prices by suburb'; and 'weekly property clearance rates' for each property type in each suburb

	• The comparison of the data in the above three documents with Perfect Property's own statistics • Providing market information for different types of property • Provide Market Data Analysis • Generate Sales Reports

4. Identify the business concepts in the above Scope Outline and categorize the business concepts into processes, functions, roles, objects, and business rules. Create a domain dictionary for Real Estate information system. [5 marks]

Real Estate Management		
Domain Dictionary		
Name	**Type**	**Description**
Prospective Buyer Registration	**Process**	Carried out before a user has entered their personal information into Perfect Property's website. This process gathers new information from the user, and in turn supplies them with a unique user ID and password that register them as a 'prospective buyer' within the system. Can be performed by a real-estate agent/realtor.
Prospective Buyer Account	**Object**	Prospective buyer account details: user ID, email address, password, contact information and phone number recorded during prospective buyer registration.
Prospective Buyer	**Role**	A potential property buyer who signs up for an account, may receive property alert emails, may set account details including buyer property preferences, may initiate a 'Viewing a Property' appointment, may decide to buy a property.
Real Estate Agent/Realtor	**Role**	Client facing role that provides services to prospective buyers and sellers. Can perform prospective buyer registration, record buyer property preferences, search, multiple listing service (MLS) search, and create a Viewing Property appointment.
Record Sellers & Property Information	**Process**	Carried out when a seller has decided to sell their property through Perfect Property. This process gathers information about the seller, seller's property, contact details, property vendor details, desired sale price, photos etc. Performed by administration staff.
Administration Staff	**Role**	Perform administrative tasks including: recording sellers & property information, property preference collation, meaningful market research, generate market data analysis, and generate sales reports.
Prospective Seller	**Role**	A potential property seller, who provides information about a property they wish to sell on Perfect Property's website to administration staff, as well as their personal details.
Record Buyer Property Preferences	**Process**	Carried out when a prospective buyer inputs the details of their desired property, such as price, location, bedrooms, bathrooms etc. The process gathers new information from the prospective buyer, and enables additional website and email functionality. Performed by the IT system or by a real-estate agent/realtor.
Buyer Property Preferences	**Object**	Buyer property preference details: personal information, preferences, budget and location details recorded about prospective buyers.

Search	**Function**	The act of providing searching services to prospective buyers and prospective sellers by the IT system.
Search	**Process**	Carried out by prospective buyers, prospective sellers and real-estate agents. The process searches all the properties listed on Perfect Property's website and allows users to filter their results according to the type of property they are looking for, including attributes such as: price, location, number of bedrooms, number of bathrooms, garage, pool etc.
Property Alert Service	**Object**	Any property alert service email provided by the IT system to a prospective buyer who has recorded their buyer property preferences.
Property Alert Service	**Function**	The act of providing the property alert service to prospective buyers who have recorded their buyer property preferences. Automated and performed by the IT system.
Property Preference Collation	**Process**	Weekly process where administration staff collate data from all prospective buyer profiles and property alert settings, record what type of properties prospective buyers are currently interested in, and compare that information against the type of properties Perfect Property has listed.
Meaningful Market Research	**Process**	Weekly process where administration staff purchase 'Weekly median house/Townhouse and Unit/Apartment prices by suburb' and 'Weekly median Land prices by suburb' and 'weekly property clearance rates' for each property type in each suburb. Perfect Property's performance is then compared to this market information and clearance rates are compared with the national average in order to provide the market with information for different types of properties, provide market data analysis and generate sales reports.
Market Research Report	**Object**	Weekly market research reports created through the 'Meaningful Market Research' process.
Market Data Analysis Report	**Object**	Weekly data analysis reports created through the 'Meaningful Market Research' process.
Sales Report	**Object**	Weekly sales report created through the 'Meaningful Market Research' process
Search Multiple Listing Service (MLS)	**Function**	The act of a real-estate agent searching the multiple listing service on behalf of a prospective buyer.
Search Multiple Listing Service (MLS)	**Process**	The process where a real-estate agent can search through the multiple listing service on behalf of a client for potential property matches outside of Perfect Property's purview.
Viewing a Property Appointment	**Process**	Scheduling a prospective buyer to view a property. Performed by a real-estate agent/realtor.
Viewing a Property Appointment	**Object**	The scheduled date and time for the real-estate agent to meet with the client at the property location.
Sales Agent	**Role**	Co-ordinates the steps involved in selling a property to a prospective buyer. Responsibilities include: presenting a buyer with a Contract of Sales to sign, serving

		intermediaries between the buyer and their attorney during the sale agreement, getting homeowner insurance, acquiring title insurance, payment processing, obtaining sales commissions, instructing the IT system to update property data, web advertisement and customer information subsystems.
Contract of Sales	**Object**	A contract drawn up for a sales agent to present to a prospective buyer to sign once they have decided to buy a property.
Homeowner Insurance	**Function**	The act of supplying the buyer with homeowner insurance when they decide to buy a new property. Performed by a sales agent.
Homeowner Insurance	**Object**	The legal documents provided to a buyer once they have agreed to insure their property with an insurer, that certify the home being insured.
Title Insurance	**Function**	The act of supplying the buyer with title insurance when they decide to buy a new property. Performed by a sales agent.
Title Insurance	**Object**	The legal documents provided to a buyer once they have agreed to insure their property with an insurer, that certify the home being insured.
Payment	**Object**	Payment details of the prospective buyer once they have committed to buy a property.
Payment Processing	**Process**	Managing buyer and seller payments, performed by administration staff.
Sales Commissions	**Business Rule**	A percentage of a property's final sale value paid to the agency and then paid to the sales agent after a seller has sold their property.
Sales Commissions	**Object**	Sale commission details of the seller provided once they have sold their property

III. Behavioural Modelling [40 marks]

After completing the domain analysis, you are ready to start use case modelling. Please make sure that you use the domain concepts identified during the domain analysis activity as the base for behavioural modelling.

5. **Select Sales Management Subsystem in the Real Estate information system as the starting point to do the behavioural modeling. There are at least six initial use case in the Sales Management Subsystem. You describe the scope of each use case in textual information. Your textual information should clearly state the goal of the use cases. [10 marks]**

Real Estate Management			
Sales Management: Use Cases Summary			
ID	**Use Case Name**	**Description**	**Actors**
100	**Present Contract of Sales**	The Sales Agent presents the Contract of Sales to the buyer(s) for signatures	Sales Agent
101	**Sign Contract of Sales**	The Buyer signs the Contract of Sales	Buyer
110	**Obtain Signed Contract of Sales**	The Sales Agent receives the signed Contract of Sales from the buyer(s)	Sales Agent

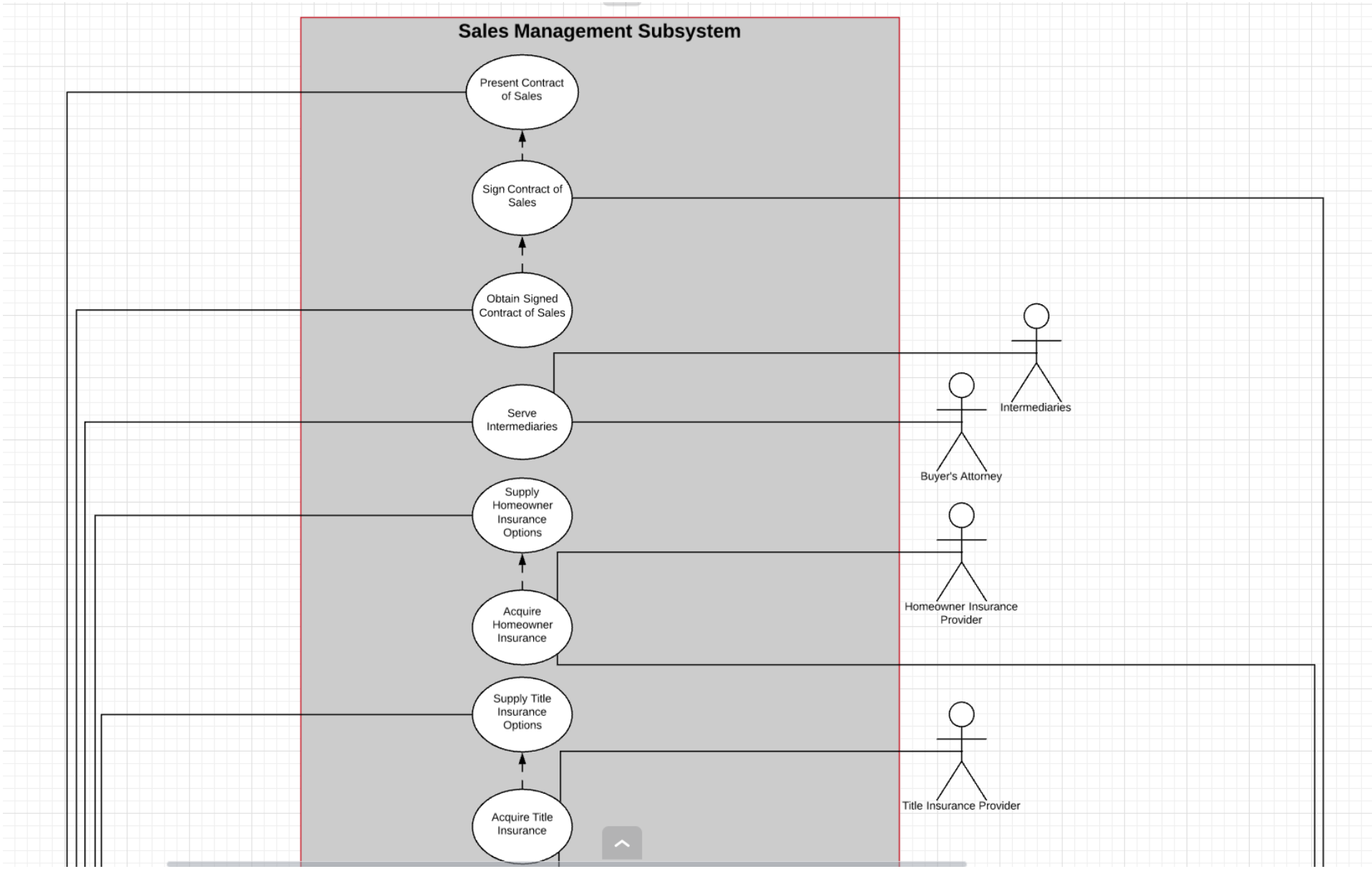
120	**Serve Intermediaries**	The Sales Agent serves the intermediaries between the buyer(s) and their attorney during the review of the purchase and sale agreement	Sales Agent, Intermediaries, Buyer's Attorney
130	**Supply Homeowner Insurance Options**	The Sales Agent provides the buyer(s) with options for Homeowner Insurance	Sales Agent
140	**Acquire Homeowner Insurance**	The buyer(s) signs up for Homeowner Insurance with a registered provider	Buyer, Homeowner Insurance Provider
150	**Supply Title Insurance Options**	The Sales Agent provides the buyer(s) with options for Title Insurance	Sales Agent
160	**Acquire Title Insurance**	The buyer(s) signs up for Title Insurance with a registered provider	Buyer, Title Insurance Provider
170	**Provide Payment Options**	The Sales Agent provides the buyer(s) with payment options	Sales Agent
180	**Payment**	The buyer(s) pay the agency using the provided payment options	Buyer
181	**Verify Credit Card**	The Buyer's Credit Card Company will verify their credit card details	Buyer's Credit Card Company
182	**Verify Bank Balance**	The Buyer's Bank will verify their bank balance	Buyer's Bank
183	**Verify Withdrawal Limit**	The Buyer's Bank will verify their withdrawal limit	Buyer's Bank
184	**Verify Foreign Bank Balance**	The Buyer's International Money Transfer Provider will verify their Foreign Bank account balance	International Money Transfer Provider
185	**Verify Agency Bank Details**	Private Property's Bank will verify the agency's correct bank details	Buyer's Credit Card Company, Buyer's Bank, International Money Transfer Provider, International Bank, Private Property's Bank
190	**Process Payment**	Administration staff process the received payment	Administration Staff
200	**Obtain Sales Commission**	The Sales Agent confirms that payment has been received through a nominated payment option	Sales Agent
210	**Update Property Data**	The Sales Agent instructs the Information System to update the property data	Sales Agent
220	**Update Website Advertisements**	The Sales Agent instructs the Information System to update the property web advertisements	Sales Agent
230	**Update Customer Information Subsystems**	The Sales Agent instructs the Information System to update data in the customer information subsystems	Sales Agent

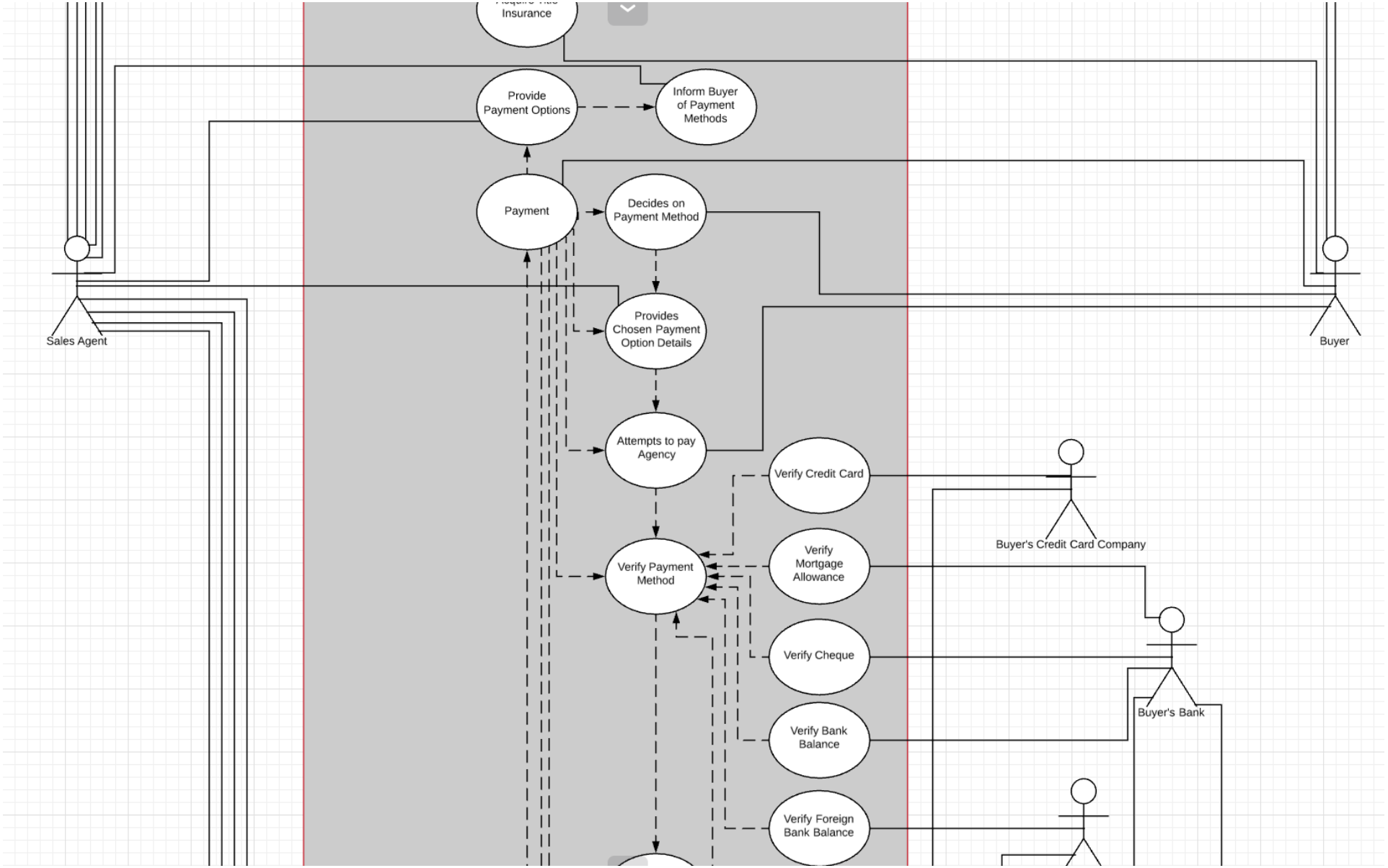
6. **Using use case templates provided below to fill in one use cases say "Match property" that related to the Property Sale Management System. You can leave the row blank in the following template if it is not applicable to your use case. Notice: You are required to "include" and "extend" other use cases in main use cases given they are relevant to the system. [10 marks]**

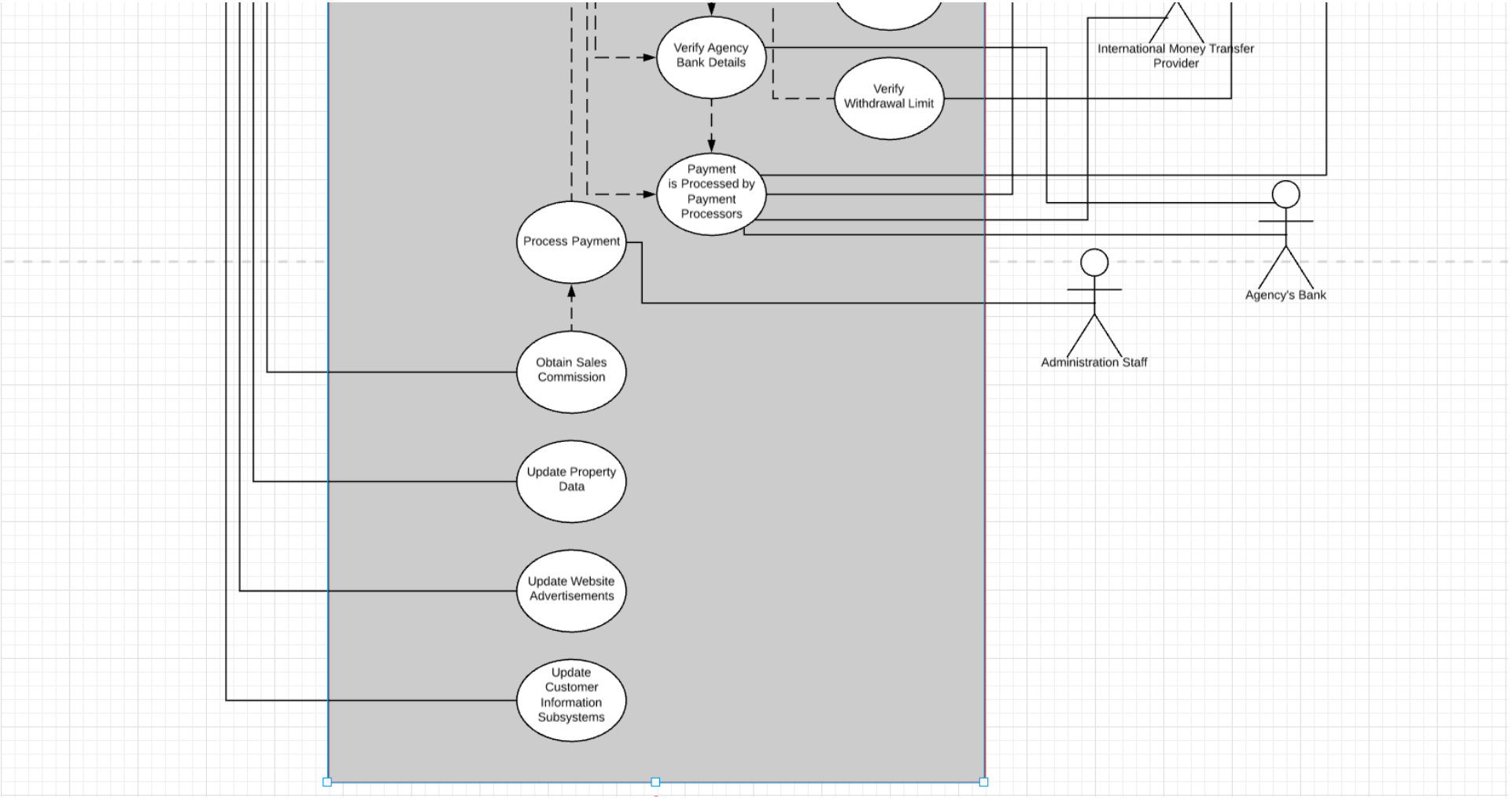
Use Case:	Payment
ID:	180
Scope:	Property Sales Management System.
Priority:	1/10
Summary:	The buyer(s) pay Private Property via a payment option that includes: credit card, debit card, cheque, mortgage provider, bank transfer, international money transfer.
Primary Actor:	Buyer
Supporting Actors:	Buyer's Credit Card Company, Buyer's Bank, Mortgage Company, International Money Transfer Provider, Private Property's Bank.
Stakeholders:	Buyer, Seller, Private Property, Sales Agent, Real Estate Agent/Realtor, Administration Staff, Intermediaries, Buyer's Attorney, Homeowner Insurance Provider, Title Insurance Provider, Buyer's Bank, Buyer's Mortgage Company, Buyer's Credit Card Company, Buyer's, International Money Transfer Provider, Private Property's Bank.
Generalization:	180: Payment
Include:	-
Extend:	181: Verify Credit Card, 182: Verify Bank Balance, 183: Verify Withdrawal Limit, 184: Verify Foreign Bank Balance, 185: Verify Agency Bank Details.
Precondition:	The buyer must have been provided with payment options and details (170: Provide Payment Details).
Trigger:	The buyer has decided to buy the property, has engaged with various services prior to finalising the sale, and now wishes to finalise the sale with the sales agent.
Normal Flow:	1. After agreeing to buy the property and signing a contract of sale, the buyer asks the sales agent to provide the agency's payment details to them 2. The sales agent provides the buyer with payment options and details 3. The buyer attempts to pay with their chosen payment method 4. The buyers chosen payment method is verified by their payment provider 5. The agency's bank details are verified by their payment provider 6. Payment is processed 7. Administration staff process the payment
Sub-Flows:	2.1. The sales agent informs the buyer of the various possible payment methods 2.2. The sales agent provides the buyer with the agency's nominated details for payment
Alternate Flow/Exceptions:	2.2a. Buyer wants to pay using a credit card/debit card. Sales agent provides a portable EFTPOS terminal for them to use 2.2b. Buyer wants to pay using cheque. Sales agent goes to the bank to cache the cheque 2.2c. Buyer wants to pay using a mortgage provider. Sales agent supplies them with the company's BSB and account number for payment. 2.2d. Buyer wants to pay using bank transfer/international money transfer. Sales agent supplies them with the company's BSB and account number for payment. 4a. The buyer pays using their credit card. Their credit card company checks their withdrawal limit 4b. The buyer pays using their debit card. Their debit card company checks their bank balance 4c. The buyer pays using cheque. The cheque is confirmed by the bank to be valid

	4d. The buyer pays using a mortgage provider. Their mortgage provider verifies their monetary allowance 4e. The buyer pays using bank transfer. Their bank checks their account balance 4f. The buyer pays use international money transfer. Their international transfer company checks their foreign bank balance 4g. The buyer's payment method is not valid and is not going to work for payment. The buyer must either choose another payment option or renege on their Contract of Sale.
Post-Condition:	Administration staff process the received payment
Non-Behavioural Requirements:	Performance, Availability, Reliability, Regulatory, Maintainability
Open Issues:	• Available payment options need to be confirmed • How are we going to assure EFTPOS terminal connection at the properties that we sell? Satellite Internet?
Source:	[Administration Staff], [Prospective Seller], [Prospective Buyer], [Sales Agent], [Contract of Sales], [Payment], [Payment Processing]
Author:	James Worcester
Revision & Date:	1.0 (9/5/2020)

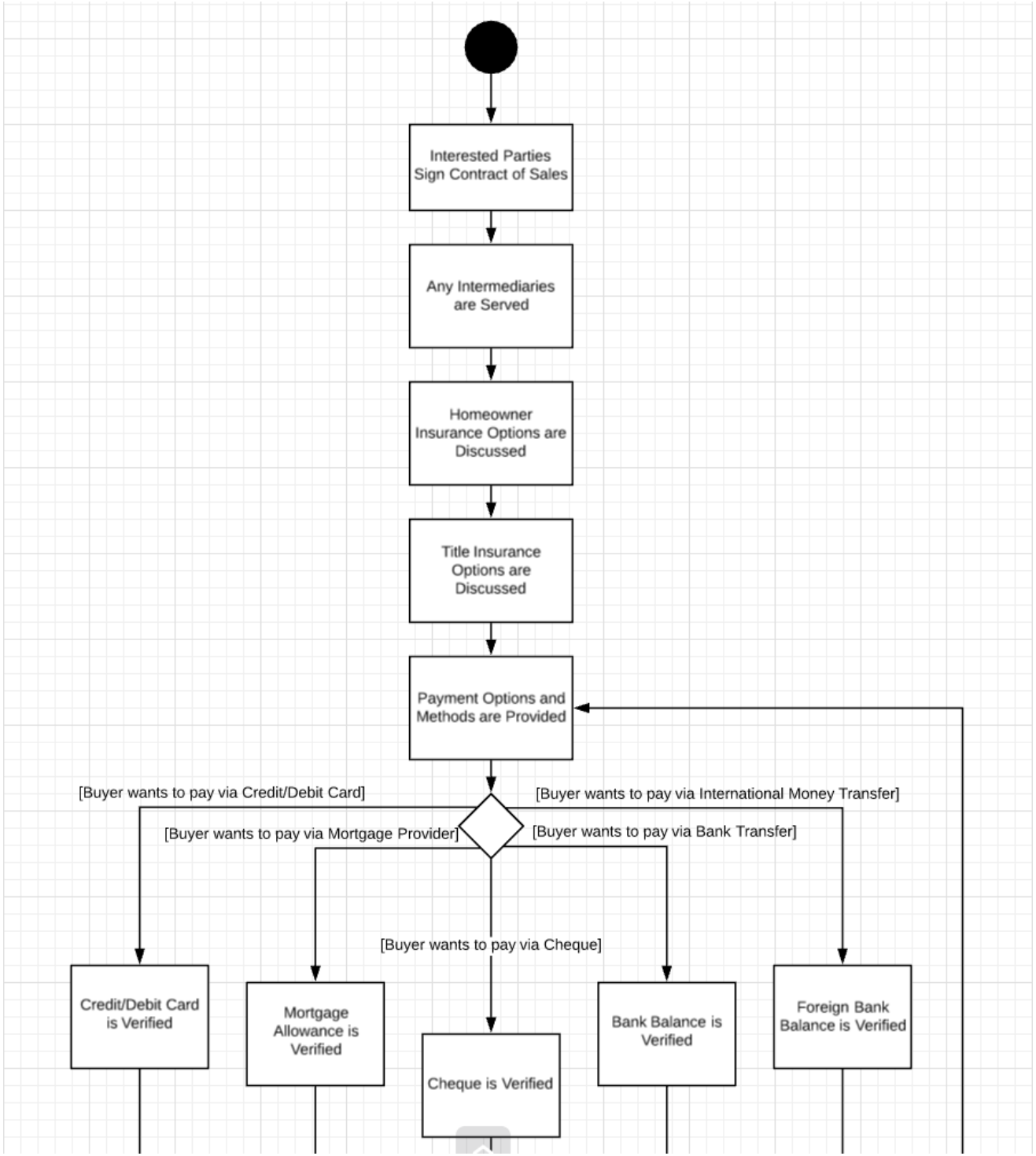
7. **Create a use case diagram for Sales Management Subsystem. Make sure you identify dependency (include & extend) relationships where applicable. [10 marks]**

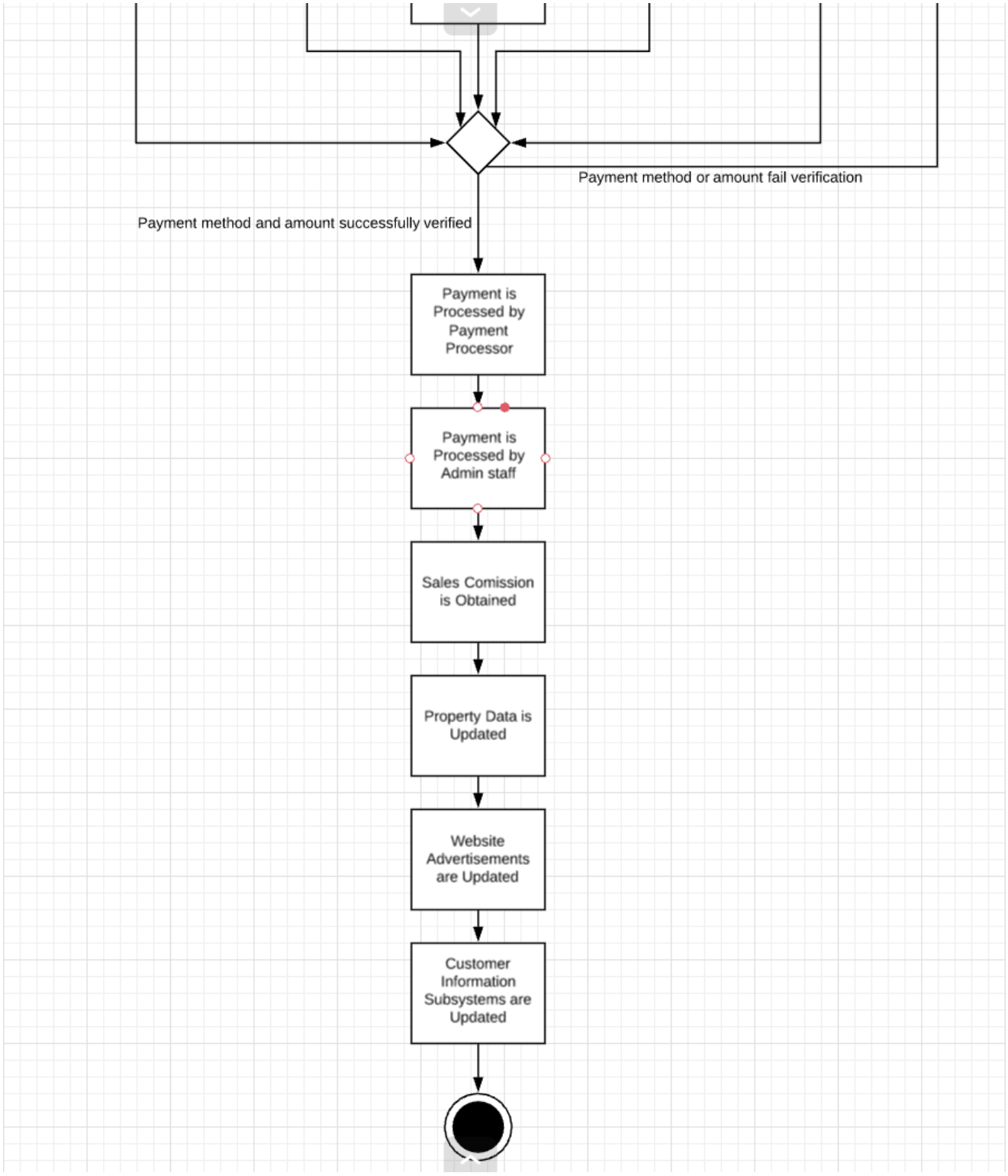

Sales Management Subsystem
Present Contract of Sales
Sign Contract of Sales
Obtain Signed Contract of Sales
Serve Intermediaries
Supply Homeowner Insurance Options
Acquire Homeowner Insurance
Supply Title Insurance Options
Acquire Title Insurance
Intermediaries
Buyer's Attorney
Homeowner Insurance Provider
Title Insurance Provider


Insurance
Provide Payment Options
Inform Buyer of Payment Methods
Payment
Decides on Payment Method
Provides Chosen Payment Option Details
Attempts to pay Agency
Verify Payment Method
Verify Credit Card
Verify Mortgage Allowance
Verify Cheque
Verify Bank Balance
Verify Foreign Bank Balance
Sales Agent
Buyer
Buyer's Credit Card Company
Buyer's Bank



8. **Create an <u>activity diagram</u> for a matching properties process. This is not a use case, but a whole logical flow of an activity. You can use all use cases in <u>Sale Management System</u>. You can also add activities that can be extended from the existing use cases. For example, "Search a Property" [10 marks]**


Interested Parties Sign Contract of Sales
Any Intermediaries are Served
Homeowner Insurance Options are Discussed
Title Insurance Options are Discussed
Payment Options and Methods are Provided
[Buyer wants to pay via Credit/Debit Card]
[Buyer wants to pay via Mortgage Provider]
[Buyer wants to pay via Cheque]
[Buyer wants to pay via Bank Transfer]
[Buyer wants to pay via International Money Transfer]
Credit/Debit Card is Verified
Mortgage Allowance is Verified
Cheque is Verified
Bank Balance is Verified
Foreign Bank Balance is Verified


Payment method or amount fail verification
Payment method and amount successfully verified
Payment is Processed by Payment Processor
Payment is Processed by Admin staff
Sales Comission is Obtained
Property Data is Updated
Website Advertisements are Updated
Customer Information Subsystems are Updated

IV.Structural and Dynamic Modelling [38 marks]

After completing the behavioural modelling, you will continue with structural and dynamic modelling.

9. **Identify grammatical objects from the use cases in property sale management to fill in the table below. (Hint, you need previous question 6 for the scenario flows of use case templates table). [4 marks]**

Grammatical Objects	Class	Comments
Contract of Sales	**Contract of Sales**	• Present contract of sales • Sign contract of sales • Obtain signed contract of sales
Final Activities	**Intermediaries**	• Satisfy intermediary actors
Homeowner Insurance	**Insurance**	• Provides homeowner insurance options • Acquires homeowner insurance
Title Insurance	**Insurance**	• Provides title insurance options • Acquires title insurance
Payment Options	**Payment**	• Provides payment options
Credit/Debit Card	**Payment**	• Verifies credit/debit card • Charges credit/debit card
Bank Balance	**Payment**	• Verifies bank balance • Charges bank account
Withdrawal Limit	**Payment**	• Verifies withdrawal limit • Charges account
Foreign Bank Balance	**Payment**	• Verifies foreign bank balance • Charges foreign bank account
Mortgage Allowance	**Payment**	• Verifies mortgage allowance • Charges mortgage provider
Chequing Account	**Payment**	• Verifies chequing account • Charges chequing account
Agency Bank Details	**Payment**	• Verifies agency bank account details • Accepts transfers
Charge Account	**Payment**	• Processes account charge
Payment Receipt	**Payment**	• Verify receipt of payment
Sales Commission	**Payment**	• Obtain sales commission
Property Data	**Web Services**	• Update property data
Website Advertisements	**Web Services**	• Update website advertisements

Customer Information Subsystem	**Web Services**	• Update customer information subsystems

10. Identify <u>entity classes</u> and write down their <u>responsibilities</u> in the following table. Do not forget to report which use cases are your sources of information [10 marks]

Class	Description	Responsibilities	Use Case
Contract of Sales	Manages the supply, signing and receiving of the appropriate Contract of Sales object	• Knows seller • Knows buyer • Knows contract of sales • Knows sales agent • Presents contract of sales • Signs contract of sales • Obtains signed contract of sales	• 100: Present Contract of Sales • 101: Sign Contract of Sales • 110: Obtain Signed Contract of Sales
Intermediaries	Satisfies any intermediary actors between the buyer and their attorney during the review of the purchase and sale agreement	• Satisfy intermediary actors	• 120: Serve Intermediaries
Insurance	Provides the buyer with options for homeowner and title insurance and manages their acquisition	• Knows buyer • Knows sales agent • Knows property details • Provides homeowner insurance options • Acquires homeowner insurance • Provides title insurance options • Acquires title insurance	• 130: Supply Homeowner Insurance Options • 140: Acquire Homeowner Insurance • 150: Supply Title Insurance Options • 160: Acquire Title Insurance
Payment	Manages all steps involved in the successful transfer of money from client to agency. Contains multiple options for payment, payment processing and variable commission amounts.	• Knows payment options • Knows payment amount • Provides payment options • Knows credit/debit card • Verifies credit/debit card • Charges credit/debit card • Knows bank account • Verifies bank balance • Charges bank account • Verifies withdrawal limit • Charges account • Knows foreign bank account • Verifies foreign bank balance • Charges foreign bank account	• 170: Provide Payment Options • 180: Payment • 181: Verify Credit Card • 182: Verify Bank Balance • 183: Verify Withdrawal Limit • 184: Verify Foreign Bank Balance • 185: Verify Agency Bank Details • 190: Process Payment • 200: Obtain Sales Commission

		• Knows mortgage provider • Verifies mortgage allowance • Charges mortgage provider • Knows chequing account • Verifies chequing account • Charges chequing account • Knows agency bank account details • Verifies agency bank account details • Accepts transfers • Processes account charge • Verifies receipt of payment • Knows commission amount • Obtains sales commission	
Web Services	Manages all steps involved in updating the information technology system after payment has been received. Includes updating property data, advertisements and customer information	• Knows property details • Updates property data • Updates website advertisements • Knows customer details • Updates customer information subsystems	• 210: Update Property Data • 220: Update Website Advertisements • 230: Update Customer Information Subsystems

11. Identify <u>attributes, operations and collaborators</u> for two classes: <u>property</u> and the <u>contract</u>. [6 marks]

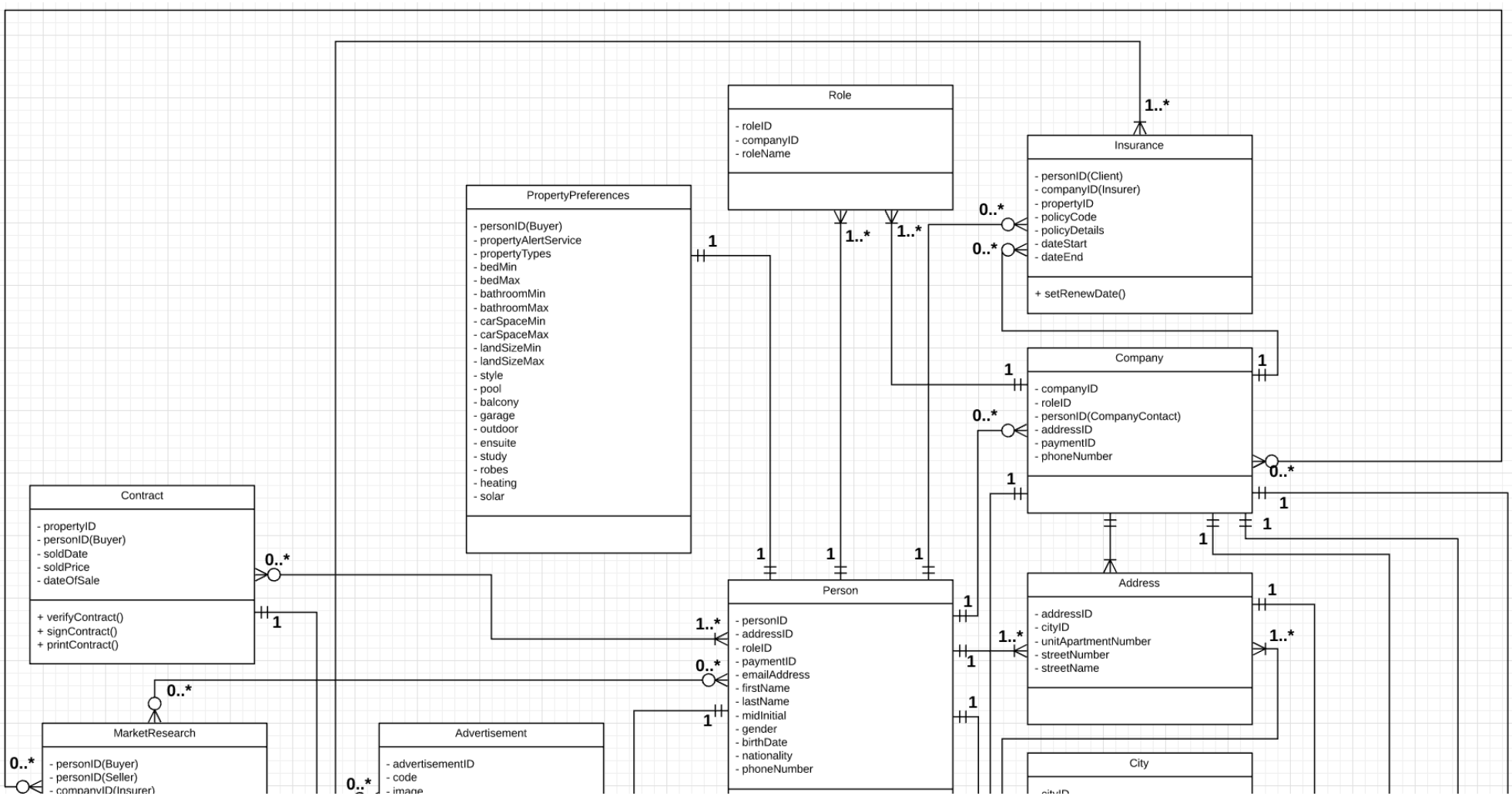
Property	
Attributes	
Attribute	**Collaborators**
propertyID	
agencyID	• Estate Agency
address	• Address
clientID	• Client (Buyer/Seller)
soldDate	
purchasePrice	
estateAgent	• Staff (Real Estate Agent)
salesAgent	• Staff (Sales Agent)
contractOfSalesID	• Contract
intermediaryID	• Intermediary
insurerID	• Insurer

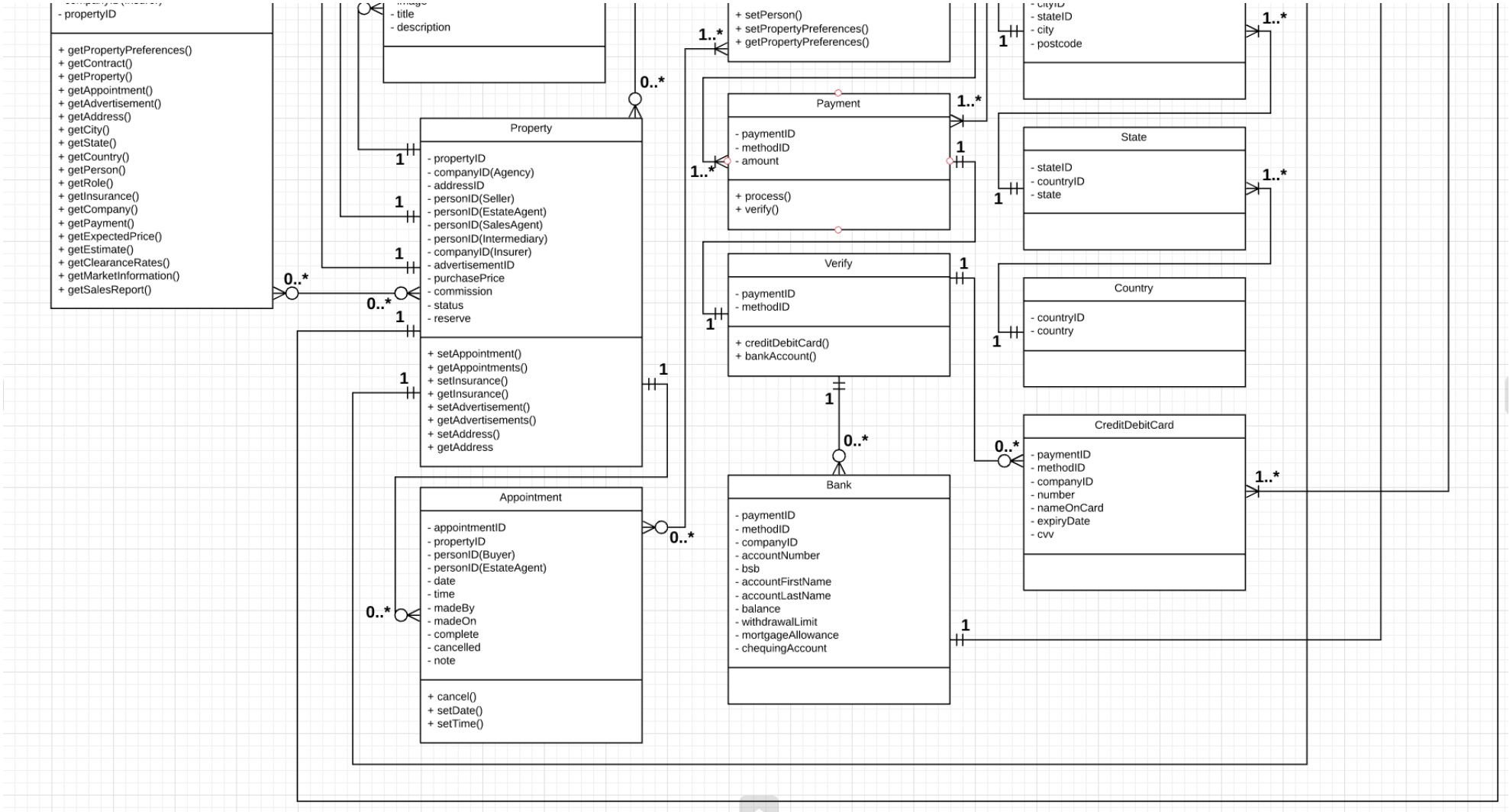
commission	
status	
reserve	
Operations	
Operation	**Collaborators**
setAppointment()	• Appointment • Staff
getAppointments()	• Appointment • Staff
setInsurance()	• Insurer • Staff
getInsurance()	• Insurer • Staff
setAdvertisement()	• Advertisement • Staff
getAdvertisements()	• Advertisement • Staff

Contract	
Attributes	
Attribute	**Collaborators**
agencyID	• Agency
propertyID	• Property
clientID	• Client
salesAgent	• Staff
intermediaryID	• Intermediary
commission	
soldPrice	
dateOfSale	
Operations	
Operation	**Collaborators**
verifyContract()	• Agency • Property • Client • Intermediary
signContract()	• Client • Agent

printContract()	

12. Create a complete <u>class diagram</u> with associations and multiplicity information. Is there any relationship in this case study that can be described by aggregation/composition? Are there classes that can be generalized/specialized? [8 marks]





The relationships in this case study that can be described by aggregation/composition include:

- The relationship between the MarketResearch class and the Person, Company and Property classes is one of composition, as MarketResearch is composed about a Person/Company/Property, and cannot exist without those objects existing
- The relationship between the Property and Advertisement classes is one of composition, as an advertisement about a property can only exist if the property exists
- The relationship between the Property and Appointment classes is one of composition, as an appointment about a property can only exist if the property exists
- The relationship between the Role class and the Person class, and the Role class and Company class, is one of composition, as a Role cannot exist without a Person/Company

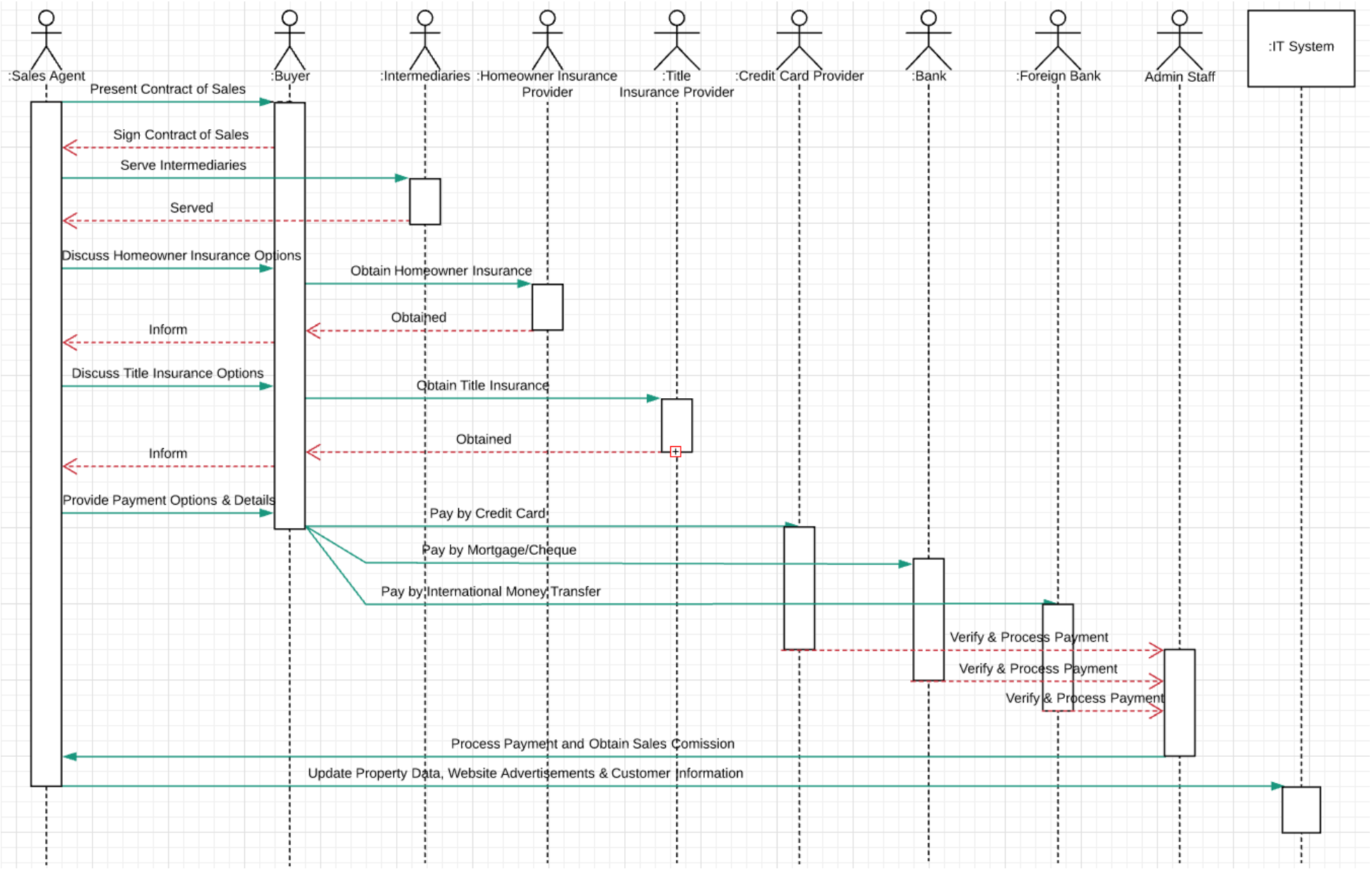
- The relationship between the Verify and Payment classes is one of composition, as you cannot verify a payment without the payment existing
- The relationship between the Address class and the City/State/Country classes is one of composition, as each address is composed of all those elements

The classes in this case study that can be generalized/specialized include:

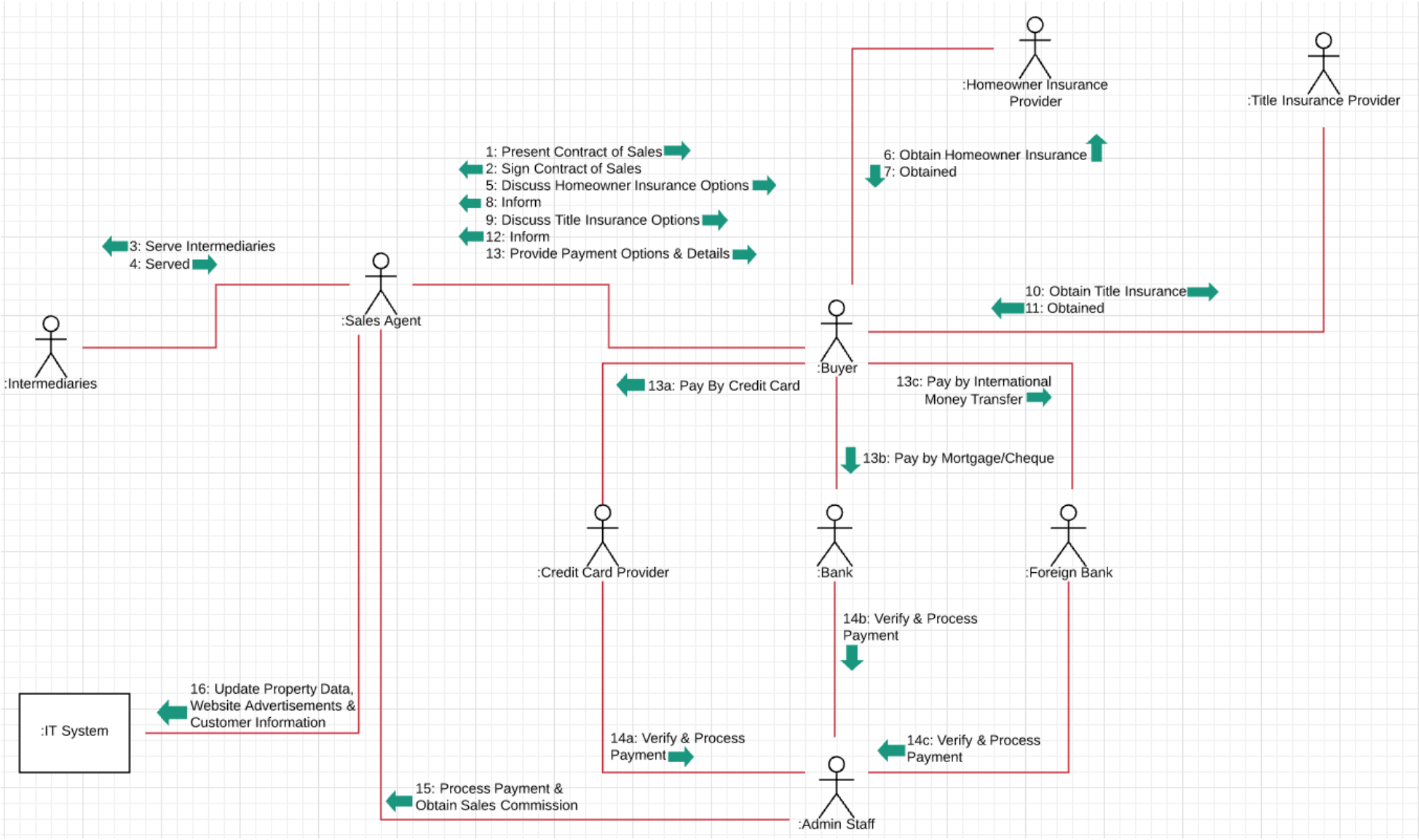
- MarketResearch is the generalized class of several smaller, more specialized forms of market research and market research processes
- Role is the generalized class for all person and company roles in the system, including staff role, client role and company role
- Person is the generalized class for all persons in the system, including: buyers, sellers, real-estate agents, sales agents, intermediaries and company contacts
- Verify, Bank and CreditDebitCard are all specialized classes that extend the Payment class
- Company is the generalized class for all companies in the system, including: real-estate agencies, insurance companies, banks and credit card companies
- Address is a specialized class of the Person class
- City, State and Country are all specialized classes of the Address class

13. **Create one <u>sequence diagram</u> of the use case you used for the template. Once completed, you need to convert the diagram into a collaboration diagram [10 marks]**

<u>Sequence Diagram</u>



Collaboration Diagram


:Homeowner Insurance Provider
:Title Insurance Provider
1: Present Contract of Sales
2: Sign Contract of Sales
5: Discuss Homeowner Insurance Options
8: Inform
9: Discuss Title Insurance Options
12: Inform
13: Provide Payment Options & Details
6: Obtain Homeowner Insurance
7: Obtained
3: Serve Intermediaries
4: Served
:Sales Agent
10: Obtain Title Insurance
11: Obtained
:Intermediaries
:Buyer
13a: Pay By Credit Card
13c: Pay by International Money Transfer
13b: Pay by Mortgage/Cheque
:Credit Card Provider
:Bank
:Foreign Bank
14b: Verify & Process Payment
:IT System
16: Update Property Data, Website Advertisements & Customer Information
14a: Verify & Process Payment
14c: Verify & Process Payment
15: Process Payment & Obtain Sales Commission
:Admin Staff