Assignment 1:
Loan Risk Assessment with Generative AI

Instructions

- Assignment 1 (60 Marks / 30%)
- This is a group assignment. Form a team of 3 members.
- **Presentation of prototype on <mark>7 Jan 2025</mark> during class session**
- **Submission of assignment on <mark>11 Jan 23:59hrs</mark>**

Context

Current Business Workflow (Traditional Human Process)

1. A loan officer or risk analyst receives a loan application and must determine the applicant's risk level and the applicable interest rate.
2. The officer logs into several separate banking systems to collect required data, such as credit score, account status and nationality. These are often different interfaces, each requiring separate searches, downloads, or data entry.
3. Certain information, such as interest rate determination and overall risk evaluation criteria, is not stored in structured databases. Instead, it resides in periodically updated PDF documents such as loan interest rate policies and risk categorization policies. These documents are lengthy and unstructured, requiring manual searching.
4. Once all the information is gathered, the analyst manually interprets and combines the data and policy rules to form a judgment on the risk level, applicable interest rate, and rationale behind the decision.
5. The analyst drafts a final response or decision note explaining the risk assessment and loan terms, which is communicated internally or to the applicant.

The following illustrates a typical scenario:

1. **Application Review**
   A loan officer or risk analyst receives a loan application and must determine the applicant's **risk level** and the applicable **interest rate**. For example:
   "What are the risk level and applicable interest rate for the customer named Andy?

   "What interest rate advice can be recommended for customer with id 1111?"

   Data Retrieval from Multiple Systems

- o The officer logs into several **separate banking systems** to collect required data:
  - **Credit Score System** → to fetch the applicant's credit score and history.
  - **Account Status System** → to check the customer's existing accounts, outstanding liabilities, repayment records, etc.
  - **Government PR Status System** → to check the Permanent Resident (PR) status of non-Singaporean.
- o These are often different interfaces, each requiring separate searches, downloads, or data entry.
- o Assume the different systems provide the data

Customer Credit score table(in Credit score system)

ID	Name	Email	Credit Score
1111	Loren	loren@gmail.com	455
2222	Matt	matt@yahoo.com	685
3333	Hilda	halida@gmail.com	825
4444	Andy	andy@gmail.com	840
5555	Kit	kit@yahho.com	350

Customer Account Status table(in Account Status system)

ID	Name	Nationality	Email	Account status
1111	Loren	Singaporean	loren@gmail.com	good-standing
2222	Matt	Non-Singaporean	matt@yahoo.com	closed
3333	Hilda	Singaporean	halida@gmail.com	delinquent
4444	Andy	Non-Singaporean	andy@gmail.com	good-standing
5555	Kit	Singaporean	kit@yahho.com	delinquent

Government PR Status check(in Government system)

ID	Name	Email	PR Status
2222	Matt	matt@yahoo.com	true
4444	Andy	andy@gmail.com	false

*These are simulated details. Use the above data to implement your own solution to store and retrieve the data, and add more data for testing purposes.
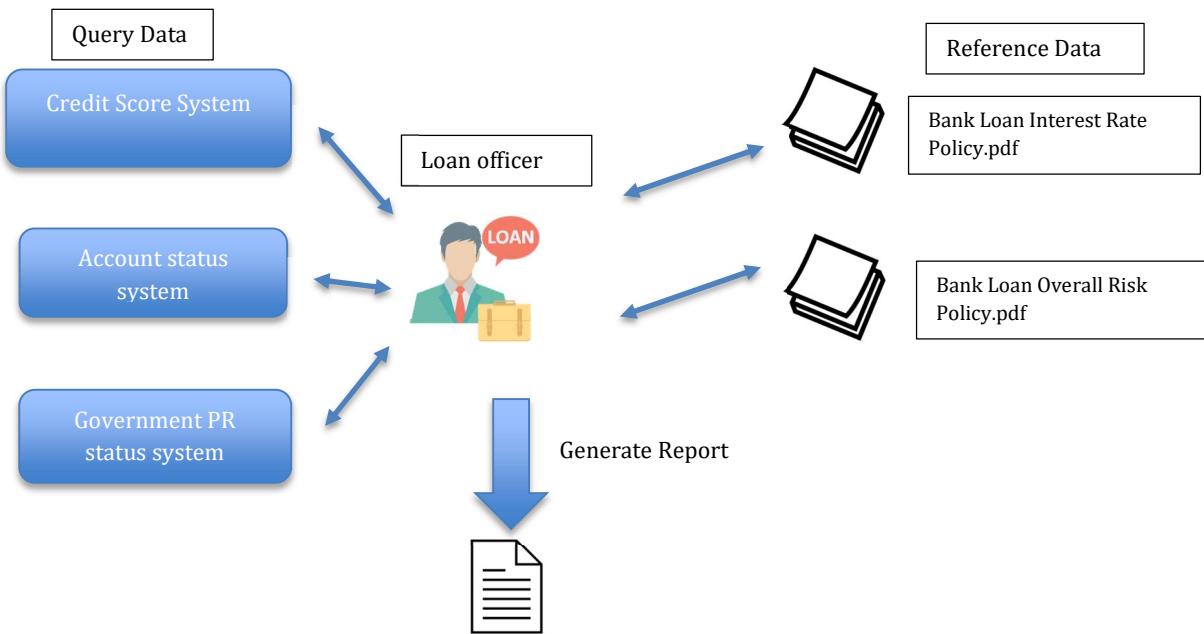
2. **Policy and Rule Lookup in Documents**

- Certain information, such as **interest rate determination** and **overall risk evaluation criteria**, is not stored in structured databases. Instead, it resides in **periodically updated PDF documents** such as:
  - Loan Interest Rate Policy documents(Bank Loan Interest Rate Policy.pdf)
  - Risk Categorization Policy documents(Bank Loan Overall Risk Policy.pdf)
- These documents are often unstructured, and require manual searching or keyword lookups by the analyst to find the relevant sections for specific customer profile.

3. **Manual Reasoning and Decision Drafting**
   - Once all the information is gathered, the analyst must **manually interpret and combine** the data and policy rules to form a judgment on:
     - The **risk level** of the applicant (e.g., low, medium, high)
     - The **applicable interest rate**
     - The **rationale** behind the decision
   - This involves applying domain knowledge, cross-checking multiple references, and ensuring compliance with current policy versions.

4. **Response Communication**
   - The analyst then drafts a final response or decision note explaining the risk assessment and loan terms. This is communicated internally to the applicant.

Query Data

Credit Score System

Loan officer

Account status system

Government PR status system

Reference Data

Bank Loan Interest Rate Policy.pdf

Bank Loan Overall Risk Policy.pdf

Generate Report

Example 1:
Customer Information: Loren, 1111, loren@gmail.com

Step 1.Retrieve information for customer information
Credit Score: 455 , Account Status: good-standing , Nationality: Singaporean

Step 2.Check Overall Risk
Credit Score: 455 , Account Status: good-standing -> overall risk: medium

Step 3.Check interest rate
 overall risk: medium -> 4.885%

Step 4. Report
Recommend the loan interest rate

Example 2:
Customer Information: Matt, 2222, matt@yahoo.com

Step 1. Retrieve information for customer information
Credit Score: 685 , Account Status: closed, Nationality: Non-Singaporean

Step 2. Check PR Status (For Non-Singapore this extra Step is needed)
PR Status -> true

Step 3. Check Overall Risk
Credit Score: 685 , Account Status: closed -> overall risk: medium

Step 4. Check interest rate
 overall risk: medium -> 4.885%

Step 5. Report
Recommend the loan interest rate, although not Singaporean but got a PR.

Example 3:
Customer Information: Andy, 4444, matt@yahoo.com

Step 1. Retrieve information for customer information
Credit Score: 840 , Account Status: good-standing, Nationality: Non-Singaporean

Step 2. Check PR Status (For Non-Singapore this extra Step is needed)
PR Status -> true

Step 3. Check Overall Risk
Credit Score: 840 , Account Status: good-standing -> overall risk: low

Step 4. Check interest rate
 overall risk: medium -> 3.175 %

Step 5. Report
Not recommend although risk is low, because Non- Singaporean and PR status is false.

Your task will be to analyze this workflow, identify the pain points, and propose a GenAI-powered or agentic AI solution that can address these challenges — particularly around unstructured data interfaces, dynamic document retrieval, and multi-system orchestration.

Part 1 – Problem Analysis (Current Workflow)
• Describe the current loan risk assessment workflow clearly, step by step, in your own words.
• Identify and explain pain points, inefficiencies, or bottlenecks.
• Highlight where human judgment, repetitive manual work, or delays occur.
• Your focus here is on understanding the existing process. Do not propose any solution yet.

Part 2 – GenAI Solution Design & Justification
• Propose a GenAI-powered solution to improve or automate the current workflow.
• Identify the steps your solution will target and explain why.
• Justify why GenAI is an appropriate approach compared to traditional methods.
• Describe your proposed architecture at a conceptual level (e.g., how GenAI fits into the business flow).
• Address practical considerations such as data handling, transparency, compliance, and operational integration.
• Outline success metrics or KPIs that would indicate the solution is effective (e.g., time saved, decision accuracy, transparency).

Part 3 – Prototype Demonstration

• Build a prototype that demonstrates how your GenAI solution could work in practice.

• The prototype must:

  - Accept sample loan application data

  - Apply your GenAI solution logic to assess or support the risk decision process

  - Generate a meaningful output (e.g., risk assessment, decision rationale, recommendation, or workflow enhancement)

• The prototype can be minimal but must be functional enough to illustrate your concept.

• Provide a short walkthrough (documentation, screenshots, or recorded demo) showing how the prototype works with example test cases.

• Your prototype should demonstrate the unique value that GenAI brings, beyond what a static rule engine can offer.

Part 4 – Documentation and Prototype(Submission)

• Document all the above Part1-3 in a document file for submission

• Submit all the prototype in Zip file or provide a Github link.

• Provide link to deployed application.

• Do a 10 mins presentation of the prototype in the classroom.

Assessment Criteria

Criterion	Marks	Excellent	Good	Fair	Need improvement
1.Problem Analysis	10	**(>9–10 m)** Comprehensive and insightful analysis of the current workflow. Identifies all pain points, inefficiencies, and dependencies with strong reasoning and examples.	**(>7–9 m)** Clear, well-organized description of most key workflow steps and issues. Shows solid understanding of pain points.	**(>5–7)** Covers main workflow and basic issues; understanding is correct but lacks depth or detail.	**(0–5 m)** Incomplete or unclear workflow description; major gaps or misinterpretation of process.
2.GenAI Solution Design & Justification	20	**(>17–20m)** Exceptionally creative and technically strong GenAI solution. Fully justified, mapped to workflow pain points, includes architecture, compliance, and success KPIs.	**(>13–17m)** Well-reasoned and coherent solution; clear justification and good practical design.	**(>10–13m)** Reasonable idea that applies GenAI appropriately; some justification and design aspects present but limited in depth.	**(0–10 m)** Weak or generic solution; unclear justification or poor GenAI alignment with workflow.
3.Prototype Demonstration	20	**(>17–20m)** Highly functional, well-tested prototype that clearly demonstrates the GenAI logic. Shows meaningful results and creative design.	**(>13–17m)** Functional prototype aligned with solution, includes test examples showing GenAI impact.	**(>10–13m)** Prototype runs and shows some connection to proposed solution; limited testing or explanation.	**(0–10 m)** Prototype incomplete, non-functional, or not relevant to proposed solution.
4.Testing, Evaluation & Validation of Prototype	10	**(>9–10 m)** Clear, systematic testing and validation;	**(>7–9 m)** Includes test cases with explanations of results and reliability.	**(>5–7 m)** Basic functional test(s) shown; limited discussion of outcomes.	**(0–5 m)** No or poor testing evidence.

		multiple cases evaluated with insights on accuracy and limitations.			