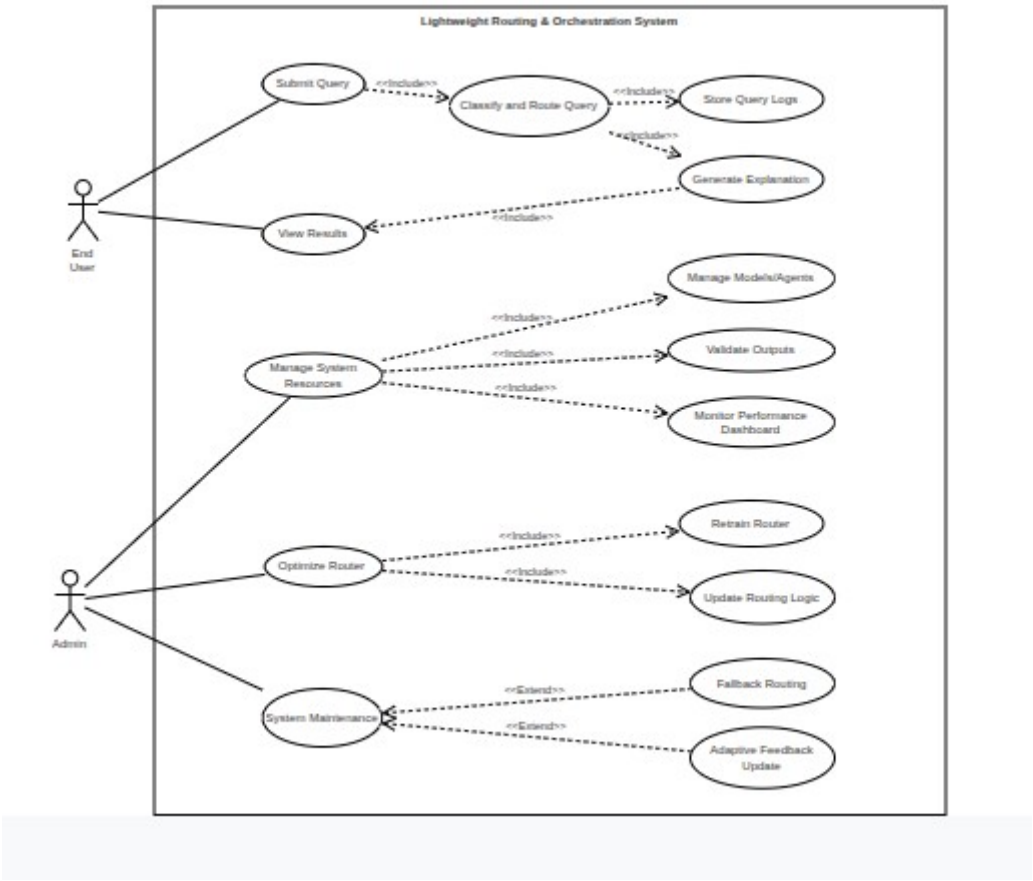
Use Cases

1. **Diagram**



2. **High-Level Use Cases**

1. User Use Cases

Use Case ID	Use Case Name	Use Case Type	Description
UC1	Submit Query	Primary	This use case allows the End User to submit a query to the system, which will then analyze and route it to the appropriate local model or specialized agent.
UC2	View Results	Primary	This use case allows the End User to view the results of their submitted query along with an explanation of the routing decision.

2. System Use Cases

Use Case ID	Use Case Name	Use Case Type	Description
UC3	Classify & Route Query	Primary	This use case allows the system to examine the incoming query, determine its complexity and intent, and direct it to the most suitable local model or agent.
UC4	Generate Explanation	Primary	This use case allows the system to produce an interpretable explanation for each routing decision.
UC5	Store Query Logs	Primary	This use case allows the system to record all routing decisions, query details, and outputs for feedback, evaluation, and adaptive learning.
UC14	Fallback Routing	Secondary	This use case allows the system to automatically escalate a query to a higher-capacity or alternative model if the primary model or agent fails local validation.
UC15	Adaptive Feedback Update	Secondary	This use case allows the system to update its routing strategy using feedback to improve future query routing decisions.

3. Admin Use Cases

Use Case ID	Use Case Name	Use Case Type	Description
UC6	Manage System Resources	Primary	This use case allows administrators to manage overall system resources, including models, agents, and system performance.
UC7	Manage Models/Agents	Secondary	This use case allows administrators to add, remove, or update models and agents, including managing their metadata; it is included in Manage System Resources.
UC8	Validate Outputs	Secondary	This use case allows administrators to check the correctness and reliability of outputs produced by models and agents; it is included in Manage System Resources.
UC9	Monitor Performance Dashboard	Secondary	This use case allows administrators to observe metrics for models and agents; it is included in Manage System Resources.
UC10	Optimize Router	Primary	This use case allows administrators to improve the routing module’s efficiency and decision-making, balancing accuracy, latency, and computational cost.
UC11	Retrain Router	Secondary	This use case allows the system to retrain router using

Use Case ID	Use Case Name	Use Case Type	Description
			historical query logs and feedback; it is included in Optimize Router.
UC12	Update Routing Logic	Secondary	This use case allows administrators to adjust router rules or policies to improve query routing; it is included in Optimize Router.
UC13	System Maintenance	Primary	This use case allows the system and administrators to maintain reliability and continuous operation through monitoring, fallback routing, and adaptive feedback updates.

3. Expanded Use Cases

Use Case: UC1 – Submit Query

Field	Details
Use Case ID	UC1
Use Case Name	Submit Query
Use Case Type	Primary
Actor(s)	End User
Description	This use case allows the End User to submit a query to the system, which will then analyze and route it to the appropriate local model or specialized agent.
Priority	High
Criticality	Critical
Trigger Event	End User wants to get information or answer from the system.
Pre-condition	End User has access to the query submission interface.
Post-condition	Query is received by the system and queued for routing and processing.
Main Scenario	1. End User logs into the system. 2. End User enters a query into the input interface. 3. End User submits the query. 4. System receives the query and confirms submission.
Alternative Scenario	End User can save the query as draft before submitting.
Exceptional Scenario	System fails to receive query; user is notified and can retry.
Frequency of Use	High – every time the user wants an answer.
Result	Query is successfully submitted and ready for processing.

Use Case: UC2 – View Results

Field	Details
Use Case ID	UC2
Use Case Name	View Results
Use Case Type	Primary
Actor(s)	End User
Description	This use case allows the End User to view the results of their submitted query along with an explanation of the routing decision.
Priority	High
Criticality	Critical
Trigger Event	End User wants to see the result of a previously submitted query.
Pre-condition	Query has been successfully processed by the system.
Post-condition	User sees the output along with routing explanation.
Main Scenario	1. User navigates to “My Queries” or result panel. 2. System displays the query result. 3. System shows which model or agent handled the query and rationale.
Alternative Scenario	User can download results or share them externally.
Exceptional Scenario	System fails to display results due to error; user is notified to retry.
Frequency of Use	High – after each query submission.
Result	End User receives query results with routing explanation.

Use Case: UC3 – Classify & Route Query

Field	Details
Use Case ID	UC3
Use Case Name	Classify & Route Query
Use Case Type	Primary
Actor(s)	System
Description	This use case allows the system to examine the incoming query, determine its complexity and intent, and direct it to the most suitable local model or agent.
Priority	High
Criticality	Critical
Trigger Event	A query is submitted by the End User.
Pre-condition	Query is received and valid.
Post-condition	Query is routed to the appropriate model or agent.
Main Scenario	1. System receives query. 2. System analyzes query complexity and intent. 3. System selects the best model or agent. 4. System forwards query to the selected model or agent. 5. System logs routing decision.
Alternative Scenario	System may queue query if all models are busy.
Exceptional	If no suitable model is available, system triggers fallback routing.

Field	Details
Scenario	
Frequency of Use	Every time a query is submitted.
Result	Query is classified and routed efficiently.

Use Case: UC4 – Generate Explanation

Field	Details
Use Case ID	UC4
Use Case Name	Generate Explanation
Use Case Type	Primary
Actor(s)	System
Description	This use case allows the system to produce an interpretable explanation for each routing decision.
Priority	Medium
Criticality	High
Trigger Event	Query is routed to a model or agent.
Pre-condition	Query routing is completed.
Post-condition	Explanation for routing is generated and stored with the query logs.
Main Scenario	1. System evaluates the routing path of the query. 2. System identifies factors influencing decision. 3. System generates a readable explanation. 4. System stores explanation in logs and associates with the query.
Alternative Scenario	Explanation may be simplified for end user view.
Exceptional Scenario	System fails to generate explanation due to processing error; default explanation is used.
Frequency of Use	Every routed query.
Result	Routing explanations are available for review and audit.

Use Case: UC5 – Store Query Logs

Field	Details
Use Case ID	UC5
Use Case Name	Store Query Logs
Use Case Type	Primary
Actor(s)	System
Description	This use case allows the system to record all routing decisions, query details, and outputs for feedback, evaluation, and adaptive learning.
Priority	High
Criticality	Critical
Trigger Event	Query processing is completed.
Pre-condition	Query has been routed and processed.
Post-condition	Query and routing details are stored in the log database.

Field	Details
Main Scenario	1. System receives processed query and results. 2. System logs query content, routing decision, model used, timestamp, and output. 3. System updates analytics or feedback modules.
Alternative Scenario	Logs can be summarized for storage efficiency.
Exceptional Scenario	Log storage fails due to database error; system retries and alerts admin if persistent.
Frequency of Use	Every query processed.
Result	Complete query history is available for auditing, learning, and system improvement.

Use Case: UC6 – Manage System Resources

Field	Details
Use Case ID	UC6
Use Case Name	Manage System Resources
Use Case Type	Primary
Actor(s)	Admin
Description	This use case allows administrators to manage overall system resources, including models, agents, and system performance.
Priority	High
Criticality	Critical
Trigger Event	Admin wants to monitor or adjust system resources.
Pre-condition	Admin is authenticated and authorized to manage system resources.
Post-condition	System resources are optimized or updated as per Admin actions.
Main Scenario	1. Admin navigates to the resource management panel. 2. Admin reviews current system resource usage. 3. Admin adjusts resource allocations. 4. System confirms the updates and logs changes.
Alternative Scenario	Admin schedules automatic resource allocation or scaling.
Exceptional Scenario	Resource adjustments fail due to hardware/software constraints; system alerts Admin.
Frequency of Use	Periodically or when performance issues arise.
Result	System resources are efficiently managed, ensuring stable performance.

Use Case: UC7 – Manage Models/Agents

Field	Details
Use Case ID	UC7
Use Case Name	Manage Models/Agents
Use Case Type	Secondary

Field	Details
Actor(s)	Admin
Description	This use case allows administrators to add, remove, or update models and agents.
Priority	Medium
Criticality	High
Trigger Event	Admin wants to update or maintain models/agents.
Pre-condition	Admin has access to resource management and model management modules.
Post-condition	Models/agents are added, removed, or updated successfully.
Main Scenario	1. Admin accesses model/agent management interface. 2. Admin selects action: add, remove, or update. 3. Admin confirms action. 4. System executes action and updates metadata. 5. System logs changes.
Alternative Scenario	Admin can batch-update multiple models/agents at once.
Exceptional Scenario	Update fails due to version conflict or invalid input; system reverts changes and alerts Admin.
Frequency of Use	As needed for system updates or maintenance.
Result	Models and agents are current, consistent, and functional.

Use Case: UC8 – Validate Outputs

Field	Details
Use Case ID	UC8
Use Case Name	Validate Outputs
Use Case Type	Secondary
Actor(s)	Admin
Description	This use case allows administrators to check the correctness and reliability of outputs produced by models and agents.
Priority	Medium
Criticality	High
Trigger Event	Admin wants to verify model or agent results.
Pre-condition	System has processed queries and produced outputs.
Post-condition	Output validation is completed; issues are logged for correction.
Main Scenario	1. Admin selects query or batch of outputs to validate. 2. System displays output details. 3. System records validation results in logs.
Alternative Scenario	Admin uses automated validation scripts to speed up verification.
Exceptional Scenario	System fails to retrieve outputs; Admin is notified.
Frequency of Use	Periodically or after major model updates.
Result	System output correctness is verified and reliable.

Use Case: UC9 – Monitor Performance Dashboard

Field	Details
Use Case ID	UC9
Use Case Name	Monitor Performance Dashboard
Use Case Type	Secondary
Actor(s)	Admin
Description	This use case allows administrators to observe metrics for models and agents.
Priority	Medium
Criticality	Medium
Trigger Event	Admin wants to monitor system performance.
Pre-condition	Admin is authenticated and system metrics are being tracked.
Post-condition	Admin receives up-to-date performance insights for decision making.
Main Scenario	1. Admin logs into dashboard. 2. System displays performance metrics 3. Admin reviews metrics and identifies potential bottlenecks. 4. Admin decides on actions or alerts.
Alternative Scenario	Admin sets thresholds to trigger automatic alerts for performance drops.
Exceptional Scenario	Dashboard fails to load due to connectivity or database error; system notifies Admin.
Frequency of Use	Daily or as needed.
Result	Admin can proactively manage performance and maintain system health.

Use Case: UC10 – Optimize Router

Field	Details
Use Case ID	UC10
Use Case Name	Optimize Router
Use Case Type	Primary
Actor(s)	Admin
Description	This use case allows administrators to improve the routing module's efficiency and decision-making, balancing accuracy, latency, and computational cost.
Priority	High
Criticality	Critical
Trigger Event	Admin identifies inefficiency or wants to improve routing decisions.
Pre-condition	Admin has access to router configuration and historical query logs.
Post-condition	Routing module is optimized, improving system efficiency.
Main Scenario	1. Admin accesses router optimization interface. 2. Admin reviews router performance metrics. 3. Admin adjusts routing parameters or rules. 4. System applies new configuration. 5. System logs optimization changes.
Alternative Scenario	Admin may simulate routing changes before applying them.

Field	Details
Exceptional Scenario	Optimization fails; system reverts to previous router configuration.
Frequency of Use	Periodically or after performance review.
Result	Routing decisions are more accurate, faster, and computationally efficient.

Use Case: UC11 – Retrain Router

Field	Details
Use Case ID	UC11
Use Case Name	Retrain Router
Use Case Type	Secondary
Actor(s)	Admin/Developer
Description	This use case allows the system to retrain the router using historical query logs and feedback to improve future query routing.
Priority	High
Criticality	Critical
Trigger Event	Admin wants to improve router decision-making based on past queries and outcomes.
Pre-condition	Historical query logs and feedback data are available.
Post-condition	Router is retrained with updated parameters or model, improving routing accuracy.
Main Scenario	1. Admin accesses router retraining module. 2. System retrieves historical query logs and feedback. 3. Admin initiates retraining process. 4. System updates router model or parameters. 5. System validates new router behavior and logs the update.
Alternative Scenario	Admin can perform retraining on a test environment before applying to production.
Exceptional Scenario	Retraining fails due to corrupted data or computation error; system alerts Admin and rolls back changes.
Frequency of Use	Periodically or after significant feedback accumulation.
Result	Router is more accurate and efficient in routing queries.

Use Case: UC12 – Update Routing Logic

Field	Details
Use Case ID	UC12
Use Case Name	Update Routing Logic
Use Case Type	Secondary
Actor(s)	Admin
Description	This use case allows administrators to adjust router rules or policies to improve query routing.
Priority	Medium

Field	Details
Criticality	High
Trigger Event	Admin identifies the need to modify routing rules or policies.
Pre-condition	Admin is authenticated and has access to router configuration interface.
Post-condition	Routing rules are updated and applied to the router.
Main Scenario	1. Admin opens router configuration module. 2. Admin reviews current routing logic. 3. Admin modifies rules or policies to optimize routing. 4. System applies the new rules. 5. System validates changes and logs the update.
Alternative Scenario	Admin may simulate routing changes on historical queries to check impact.
Exceptional Scenario	Configuration error occurs; system rejects changes and notifies Admin.
Frequency of Use	As needed for system optimization.
Result	Router operates under updated logic, improving routing efficiency and accuracy.

Use Case: UC13 – System Maintenance

Field	Details
Use Case ID	UC13
Use Case Name	System Maintenance
Use Case Type	Primary
Actor(s)	Admin
Description	This use case allows the system and administrators to maintain reliability and continuous operation through monitoring, fallback routing, and adaptive feedback updates.
Priority	High
Criticality	Critical
Trigger Event	Scheduled maintenance or detection of system performance issues.
Pre-condition	Admin is authenticated and has access to system maintenance tools.
Post-condition	System is maintained, stable, and logs are updated.
Main Scenario	1. Admin accesses maintenance panel. 2. Admin performs routine system checks and maintenance tasks. 3. System runs fallback routing and adaptive feedback modules as part of maintenance. 4. System logs all maintenance activities.
Alternative Scenario	Admin can schedule automated maintenance and monitoring tasks.
Exceptional Scenario	Maintenance task fails due to unexpected system error; system alerts Admin and rolls back critical changes.
Frequency of Use	Weekly, monthly, or as needed.
Result	System remains reliable, updated, and continuously operational.
