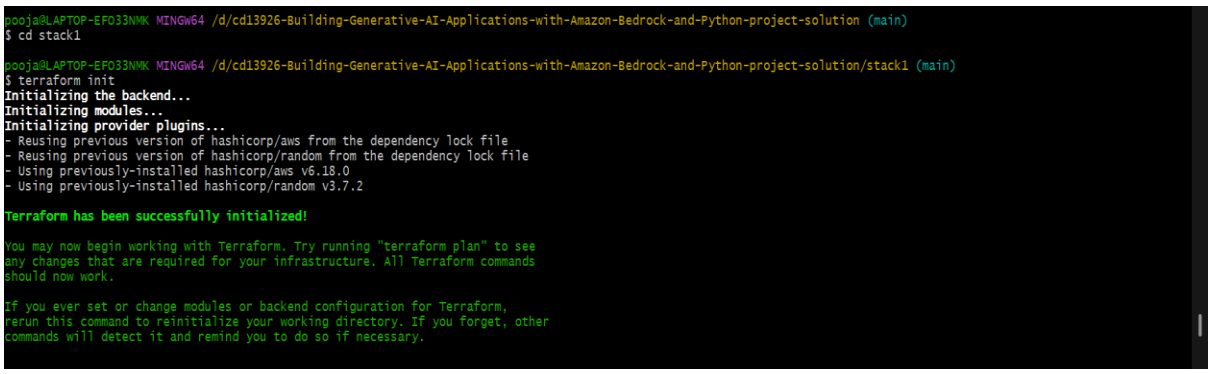
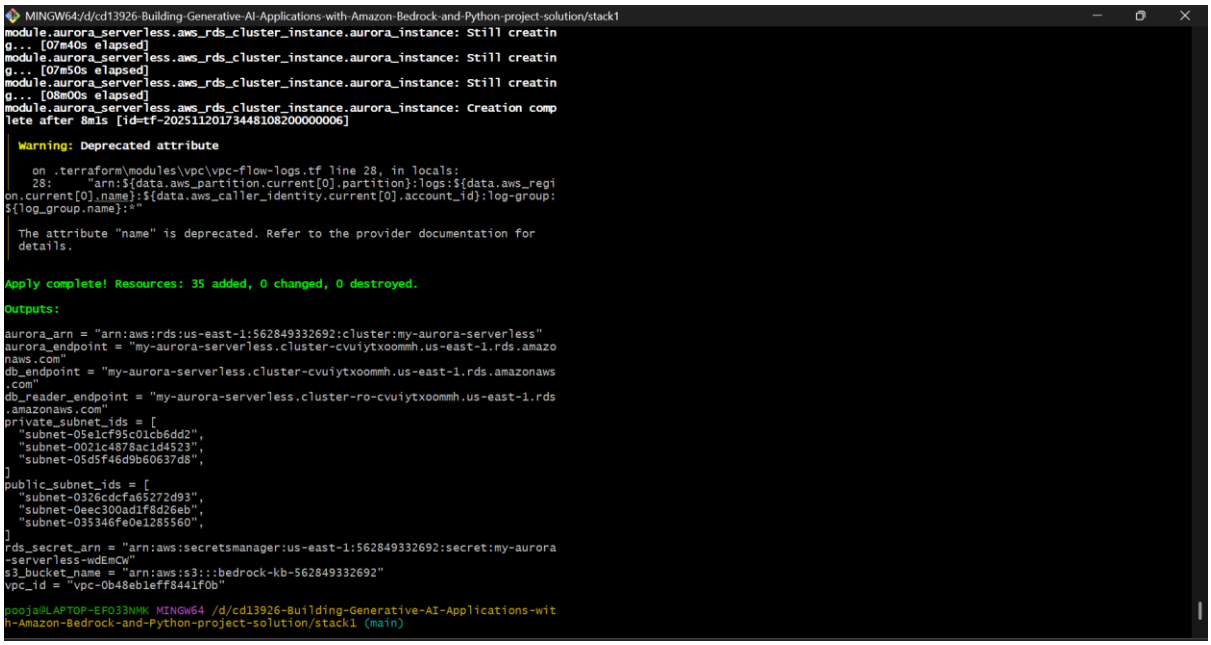
Project Summary

1. Infrastructure Deployment – Stack 1 (VPC, Aurora Serverless, S3)

I started the project by setting up the basic infrastructure outlined in Stack 1. This included the VPC, subnets, routing settings, a Serverless Aurora PostgreSQL cluster, and the S3 bucket for storing PDF documents for the Bedrock Knowledge Base.

I went into the stack1 directory and initialized Terraform. After checking the variables, which included the AWS region, CIDR ranges and DB settings, I launched the deployment with terraform apply. Once the plan seemed correct, I confirmed it and waited for Terraform to finish the setup.





After the deployment finished, I gathered the outputs, especially the Aurora cluster endpoint. I used this endpoint in the Query Editor while preparing the database.

2. Preparing the Aurora Database (SQL Execution in Query Editor)

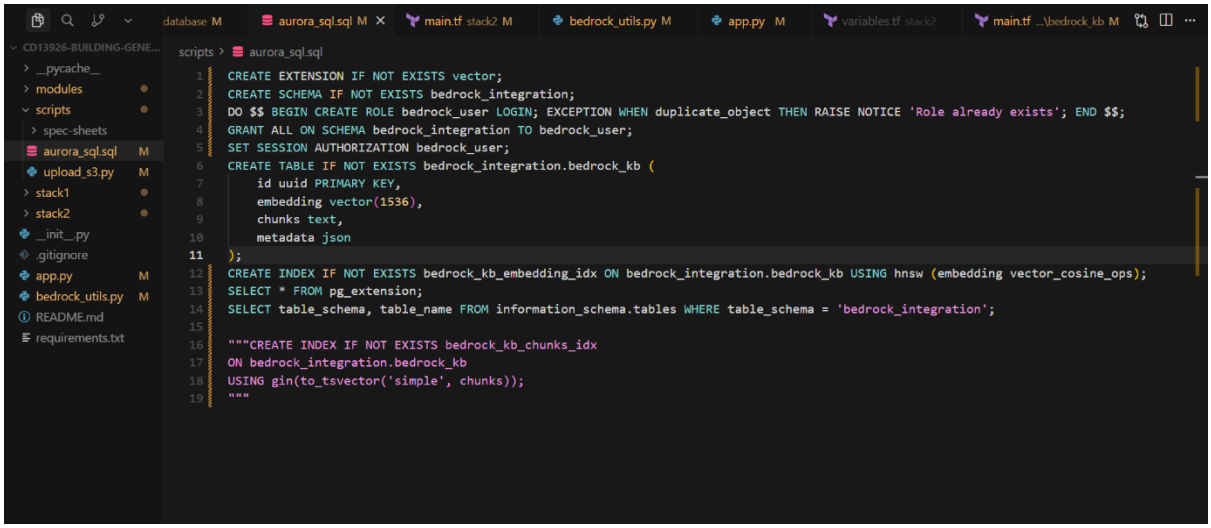
Once Aurora was provisioned, I opened the Query Editor inside the Amazon RDS console and connected using the credentials stored in AWS Secrets Manager.

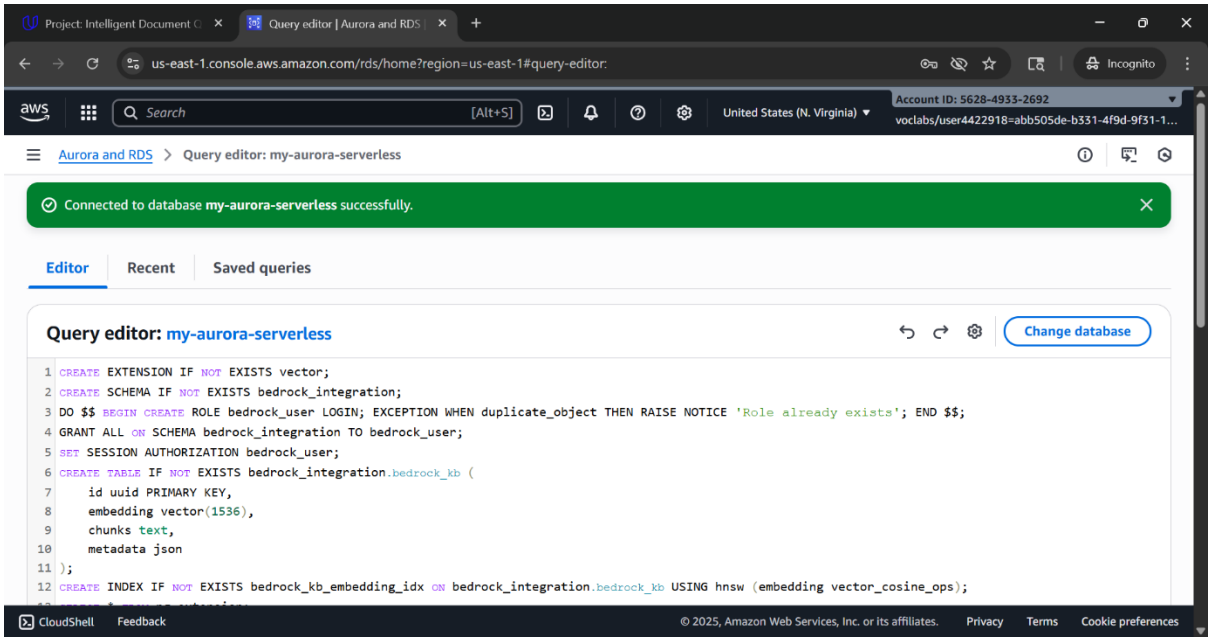
Inside the Query Editor, I executed the SQL script from scripts/aurora_sql.sql, which created:

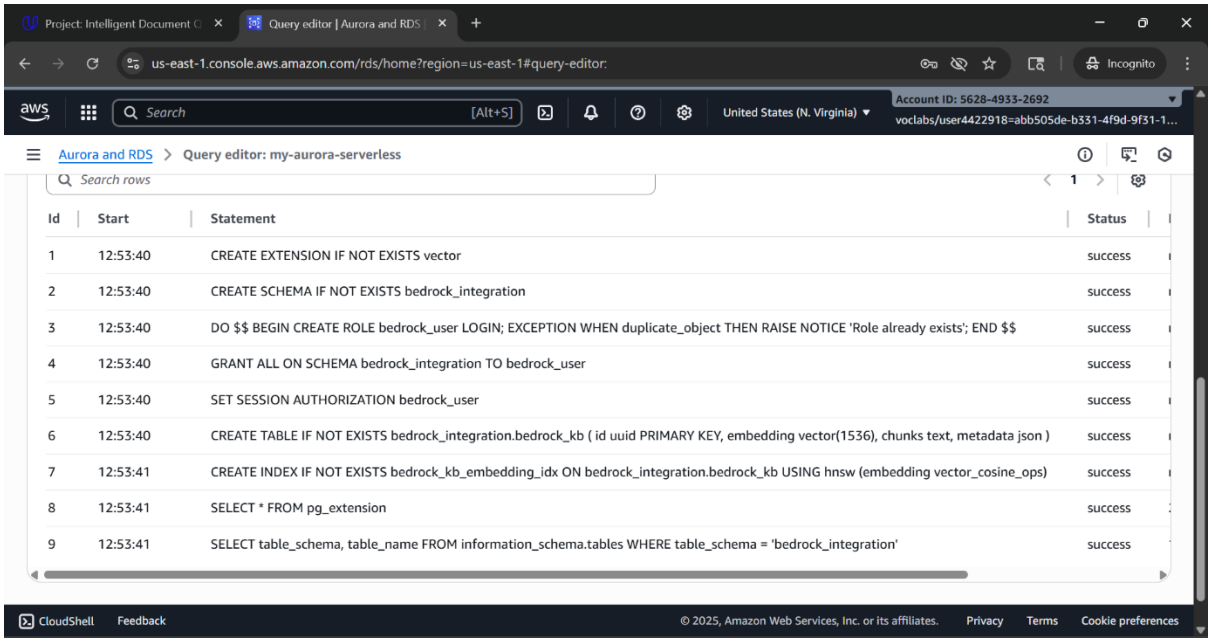
- the required bedrock_integration schema
- the vector extension

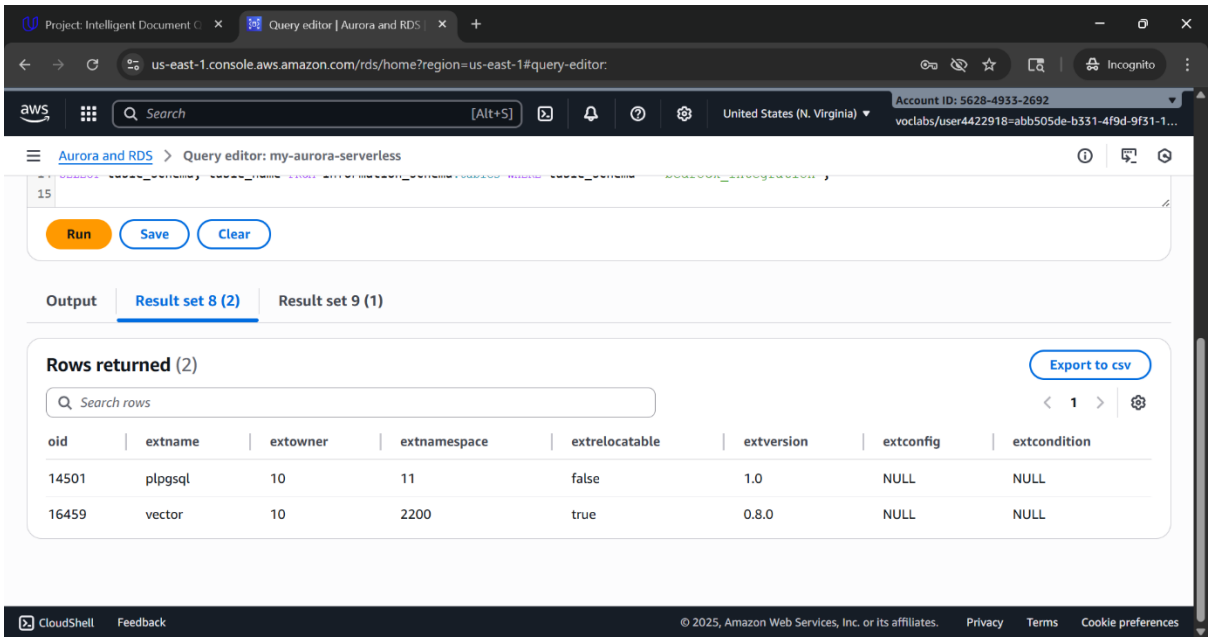
- user roles
- the bedrock_kb table
- a vector index
- a text search GIN index

This structure prepares the database to store embeddings, metadata, and chunked content for retrieval.





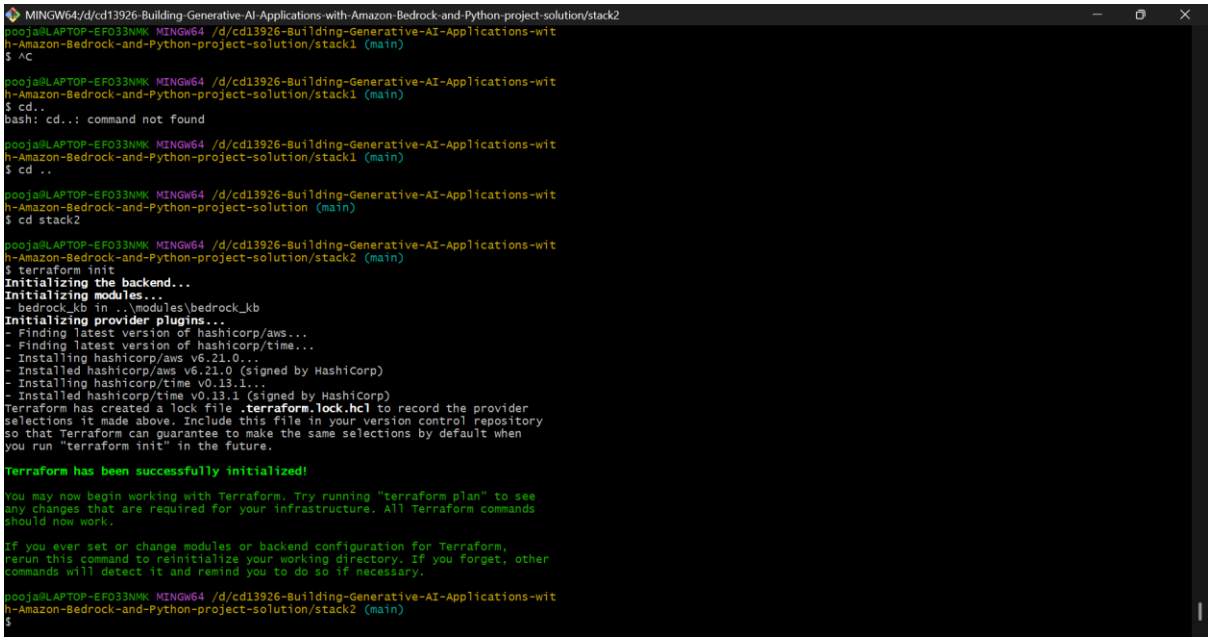


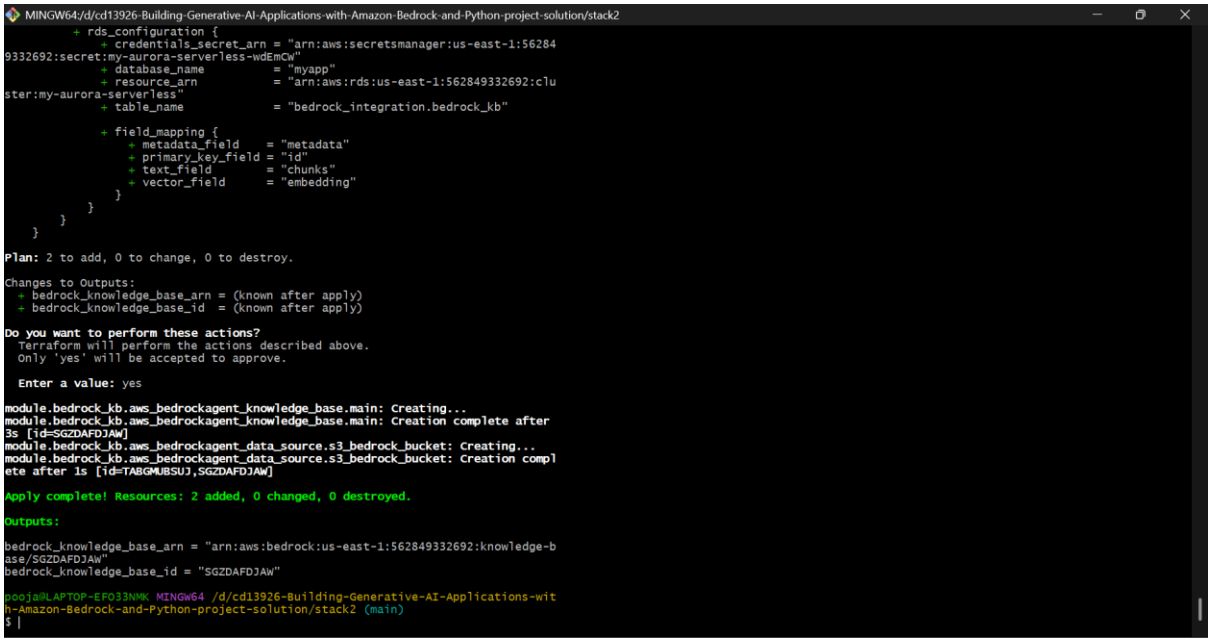


This confirmed that the schema, table, indexes, and extensions were all properly created.

3. Infrastructure Deployment – Stack 2 (Bedrock Knowledge Base)

After finishing the database preparation, I went to Stack 2, which manages the Bedrock Knowledge Base and its related resources. I ran Terraform again, updated the variables using the output values from Stack 1, including the Aurora cluster endpoint, S3 bucket, and DB secrets, and then applied the configuration. The apply step created the Bedrock Knowledge Base, set up the data source configuration, and established IAM roles and integration for knowledge retrieval.

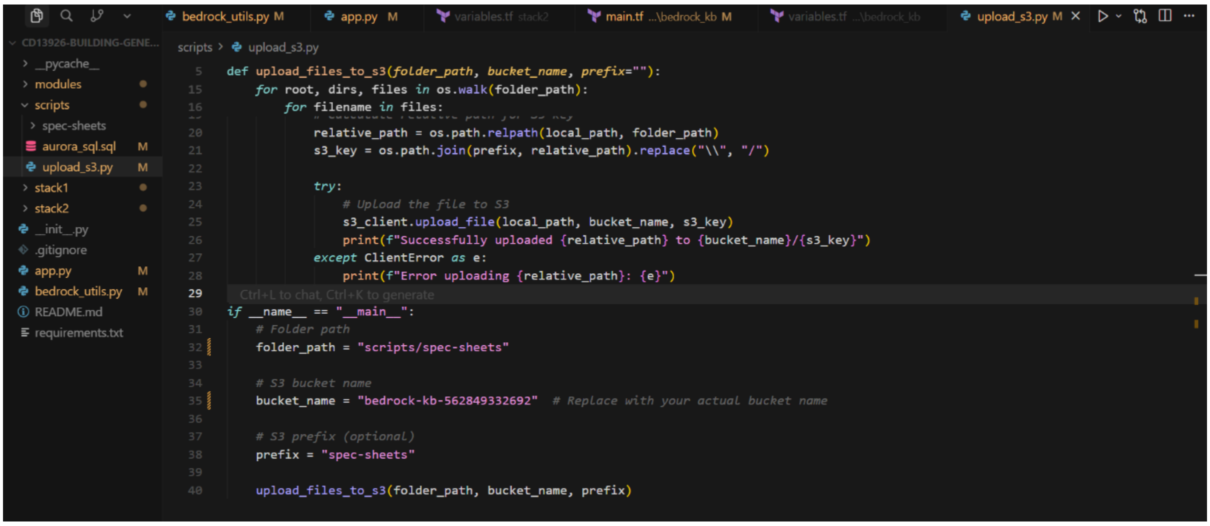


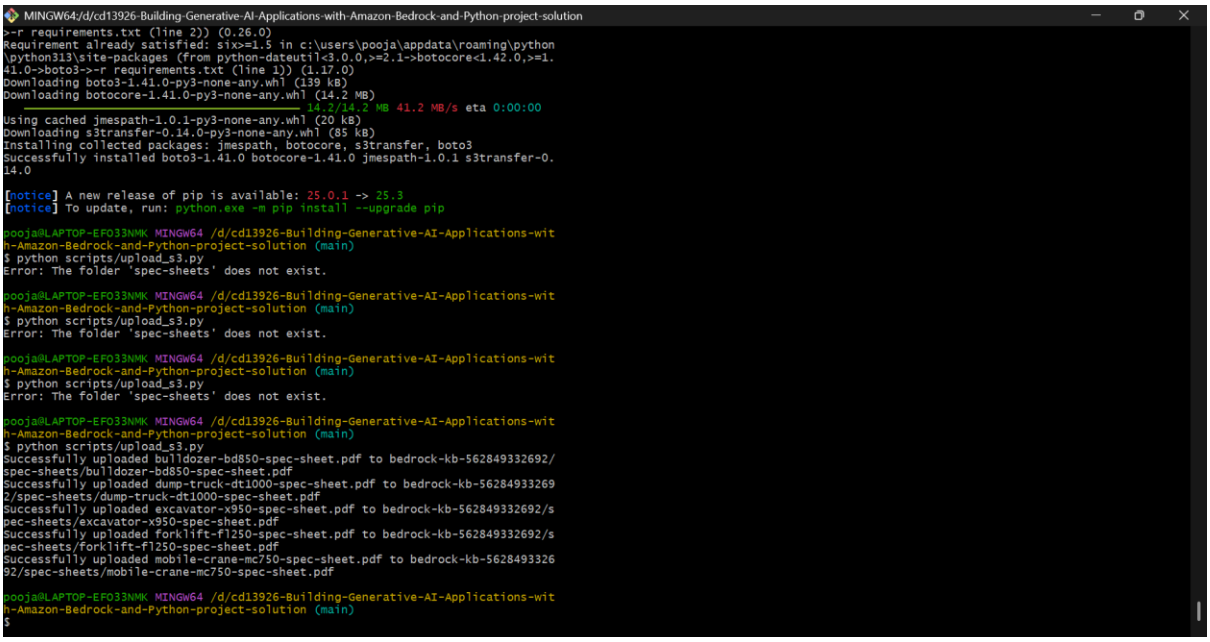


Once deployed, the knowledge base existed but contained no documents yet, that part came next.

4. Uploading PDF Files to S3

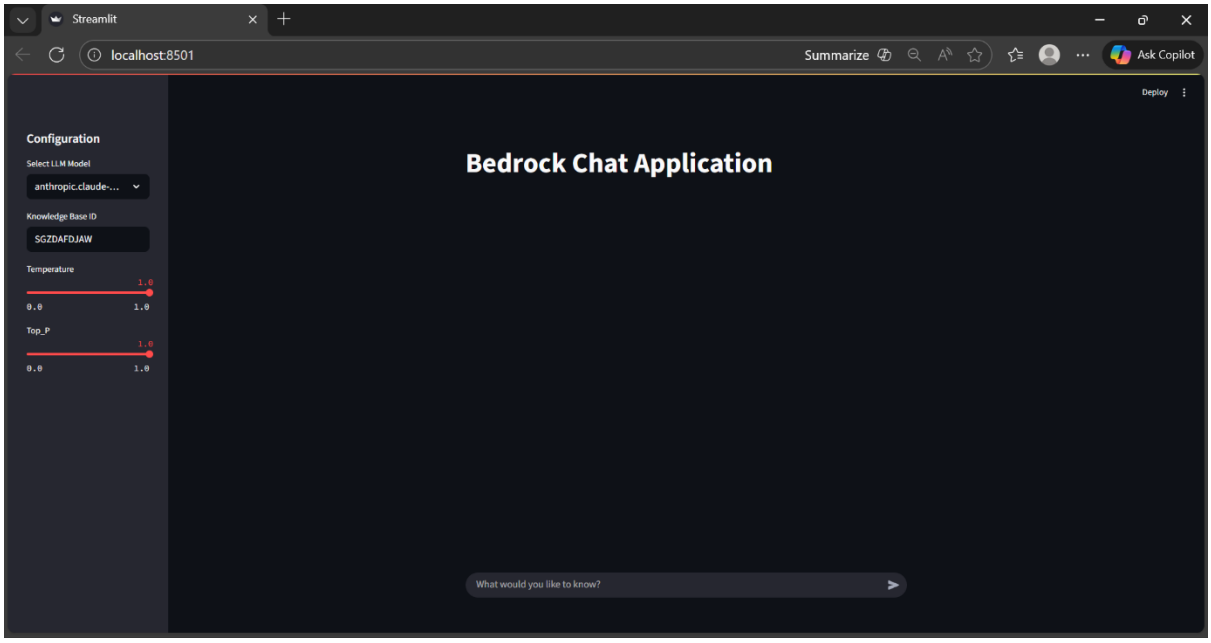
I put the machine PDF files in the spec-sheets/ folder. Then, I used the Python script scripts/upload_to_s3.py to upload everything in batches to the S3 bucket created by Stack 1. The script went through the folder and kept the structure. It uploaded all PDFs to the right S3 prefix. After the upload, the Bedrock Knowledge Base data source was able to sync them.





6. Completing the Application Logic

Since the project included a working sample application, I simply ran the provided app.py file without needing to implement or modify any of the core logic. The application was already configured to call the Knowledge Base, retrieve document chunks from Aurora, and generate grounded model responses using Bedrock. Running the app verified the full retrieval-augmented workflow end-to-end.


Streamlit
localhost:8501
Summarize
Ask Copilot
Deploy
Configuration
Select LLM Model
anthropic.claude-...
Knowledge Base ID
SGZDAFDJAW
Temperature
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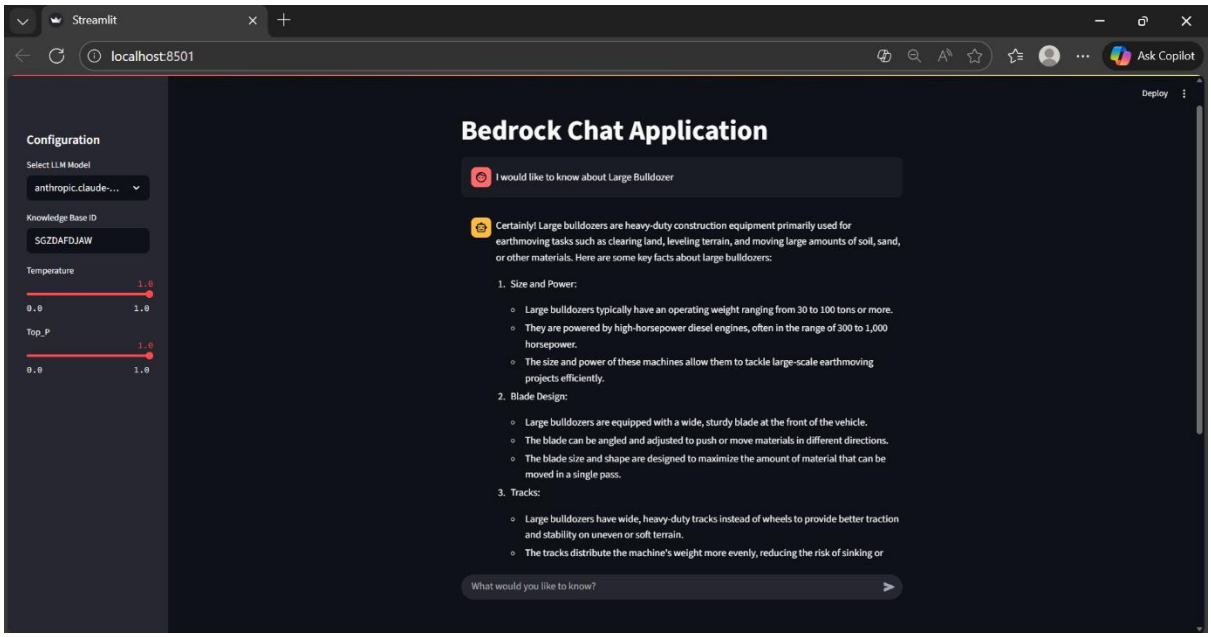
Bedrock Chat Application
What would you like to know?


Streamlit
localhost:8501
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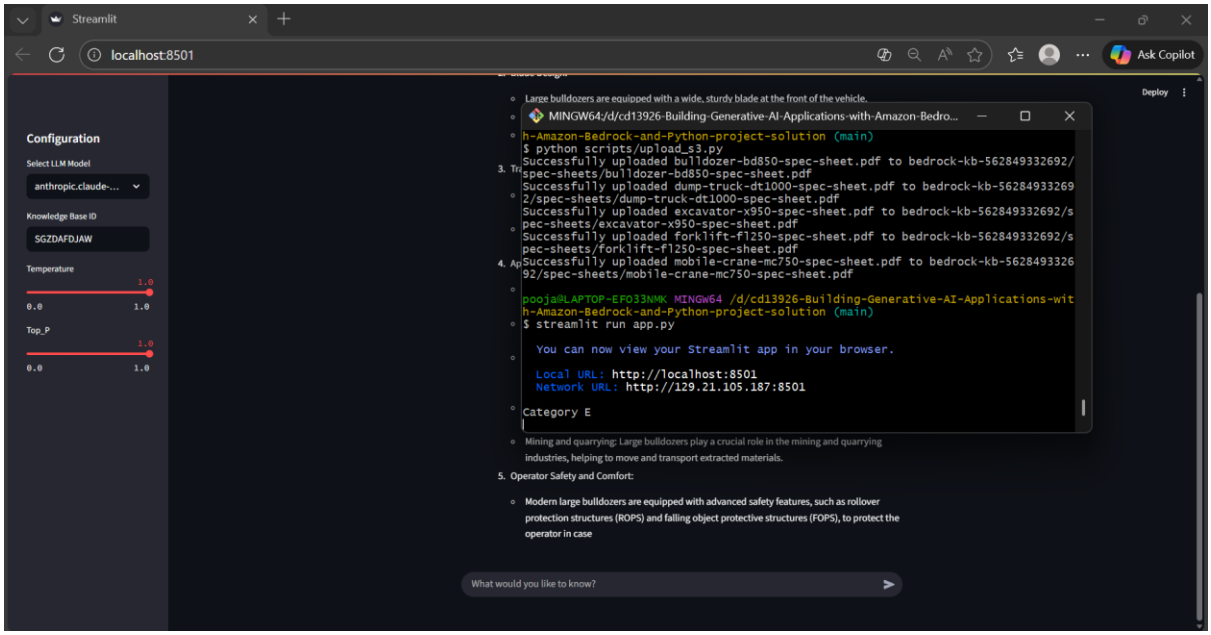
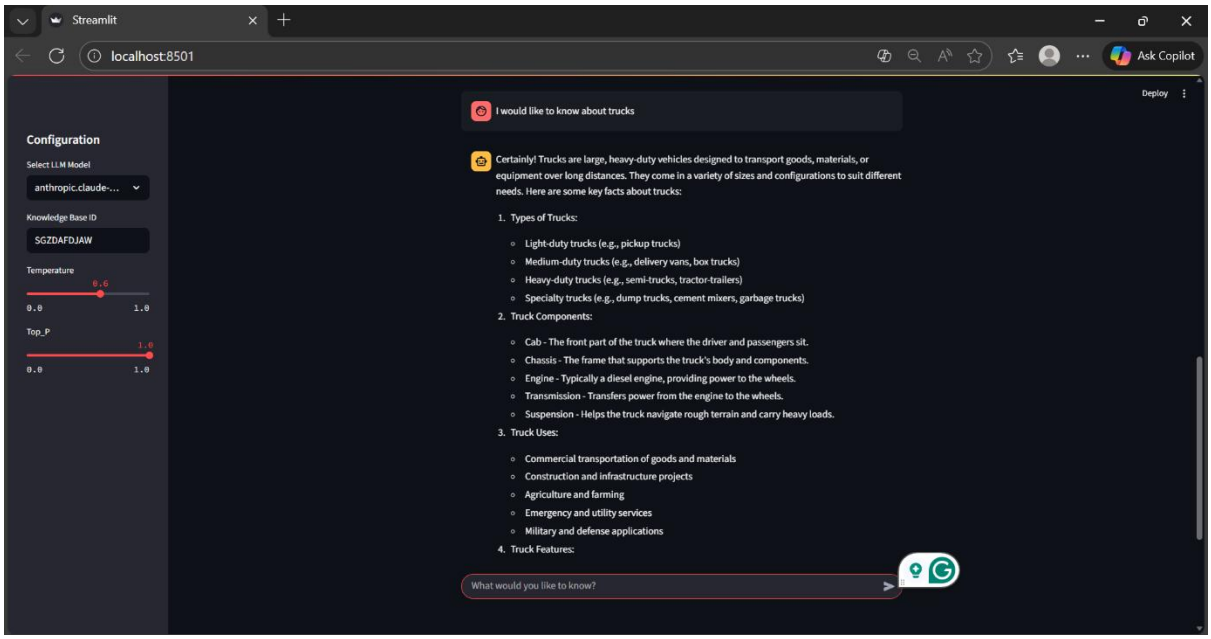
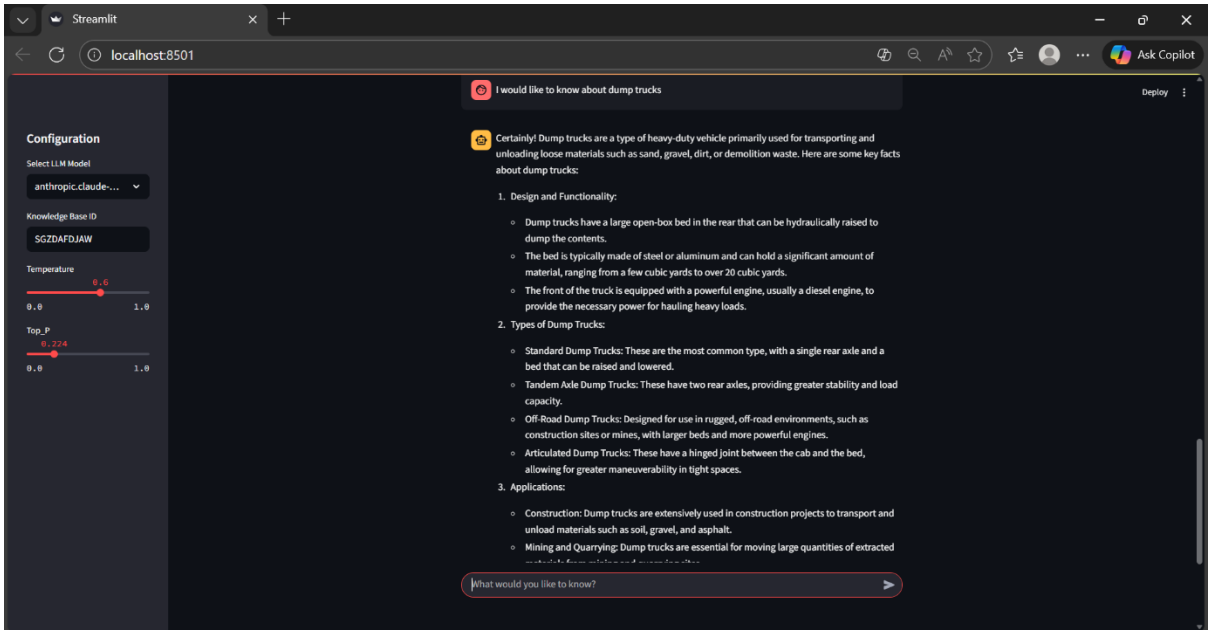
Bedrock Chat Application
I would like to know about Large Bulldozer
Certainly! Large bulldozers are heavy-duty construction equipment primarily used for earthmoving tasks such as clearing land, leveling terrain, and moving large amounts of soil, sand, or other materials. Here are some key facts about large bulldozers:
1. Size and Power:
- Large bulldozers typically have an operating weight ranging from 30 to 100 tons or more.
- They are powered by high-horsepower diesel engines, often in the range of 300 to 1,000 horsepower.
- The size and power of these machines allow them to tackle large-scale earthmoving projects efficiently.
2. Blade Design:
- Large bulldozers are equipped with a wide, sturdy blade at the front of the vehicle.
- The blade can be angled and adjusted to push or move materials in different directions.
- The blade size and shape are designed to maximize the amount of material that can be moved in a single pass.
3. Tracks:
- Large bulldozers have wide, heavy-duty tracks instead of wheels to provide better traction and stability on uneven or soft terrain.
- The tracks distribute the machine's weight more evenly, reducing the risk of sinking or
What would you like to know?



To complete the project requirements, I also generated different responses using various temperature and top_p settings inside the application. These settings helped me observe how the model output changes under different sampling conditions. Lower temperature and top_p settings produced highly consistent, factual responses, while higher values generated more expressive and varied outputs. I captured screenshots of these tests as part of the required submission.





After completing all steps, I collected the required screenshots, organized them into the Screenshots directory, verified my Terraform stacks, SQL setup, ingestion job, and application run were all correct, and packaged the entire project for submission exactly as required in the rubric.