BASIC TASK

Data transmission and format conversion: When robot sensors collect environmental data, middleware may be responsible for converting this data into a format that the patrol robot control system can understand

Communication protocol conversion: Middleware may need to convert the communication protocol between robots and campus security systems or other smart devices.

Transaction processing: Middleware can manage complex transaction processing to ensure data consistency and integrity. That is, when the robot performs a series of patrol tasks, ensure that the execution of each task is reliable and traceable.

MEDIUM TASK

a) Scenarios: **Automatic ship distress alarm**

required data List----

Alarm details: Alarm ID, alarm time, alarm type (such as collision, fire alarm, water immersion), alarm level.

Location information: latitude and longitude, heading, and speed of the ship.

System status: Alarm ID, battery status, signal strength, fault code.

Environmental data: water temperature, water pressure, and ship structural integrity testing.

Video/Image Data: Videos or images captured by surveillance cameras.

Communication records: communication content and timestamp with the rescue center.

b) Database type decision tree example

alert details and location information: relational database (such as MySQL or PostgreSQL).

Reason: alarm details, location information requires strong consistency and complex queries, making it suitable for relational databases. ACID transactions need to be supported to ensure high consistency.

System status and communication records: time series databases (such as InfluxDB).

Reason: system status, communication records need to be quickly written and queried over time ranges using a time series database. Optimize the storage and querying of time series data for trend analysis.

Video/image data: NoSQL databases (such as Amazon S3 or Google Cloud Storage).

Reason: videos/images require high-capacity storage and high concurrency read and write, using NoSQL databases or object storage services can provide high concurrency read and write while supports large file storage.