Reflection Report

RPC and Message Passing

RPC enables clients to invoke functions of the server in a manner like it was local and it is easier to communicate. The structure of message transmitting systematizes the process of information exchange, and the process of communication becomes more structured. They combine to assist the server to process the requests effectively and simplify the maintenance of the system. Scalability is also enhanced by message passing where the server can handle the number of requests simultaneously without blocking other clients.

Concurrency and Synchronization

Go supports parallel connections through goroutines, implying that the connections are independent of one another (client requests). This ensures that the server is responsive even when several clients are using it. To ensure that race conditions do not occur in a system where many clients share common resources, such as the list of papers in the in-memory, synchronization is significant.

Fault Tolerance and Reliability

In case notifications are lost due to RabbitMQ failure, RPC calls such as adding or getting papers would still be possible. To make the notification service more resilient, it may be proposed to have message persistence and message retry to make sure that even in case of failures, messages are delivered.

File Storage in Memory

The speed of remembering paper material is short-term. Big files or numerous papers may overload the memory, and all the data will be lost in case the server is restarted. It is preferable to store the content in some form of database or disk and then only the metadata in memory to access it in a faster manner.

Real-World Applications

This system might be further extended in various ways to make it more practical:

- Keyword search Store metadata and optionally content in a searchable index that enables clients to search papers by author, title or keywords in a search.
- Various formats:Enable uploading and downloading papers in various formats (PDF, DOCX, TXT). Conversion between formats could be done on-demand or various versions stored on the server.

- Access control: User authentication and permissions must be implemented, only authorized users should be allowed to upload, download or modify papers.
- Notification system: Improve the existing message-passing system and send users the notification about new papers or updates in real time.

Such extensions would enhance the system and bring to the light of having a real academic paper repository.