

Peer response 1 – Noora

Agent Communication Languages (ACLs) such as KQML are designed to enable meaningful communication between autonomous agents, allowing them to express intentions and interact through structured message types (Finin *et al.*, 1994). They provide flexibility and semantic richness in distributed systems, accommodating diverse platforms that require collaboration without tight integration—a limitation of standard programming languages such as Python or Java (Cohen and Levesque, 1995).

However, working with ACLs encompasses many challenges, including establishing consistent ontologies and addressing potential misinterpretations, ultimately introducing overheads that can challenge smaller systems (Cohen & Levesque, 1995). By contrast, method invocation in languages such as Python or Java fosters simplicity, speed, and ease of debugging, making it more suitable for tightly coupled systems with shared structures (Bennett, Farmer and McRobb, 2016).

Noora and Marwa highlight the need to consider the appropriate context for employing ACLs versus traditional programming methods. While ACLs offer enhanced autonomy and semantic communication, they demand greater planning and coordination, particularly concerning message semantics. ACLs may present significant advantages for complex and open-ended applications where agents operate in varied environments (Woolridge, 2009). However, for simpler, well-defined applications, traditional method invocation remains more efficient and straightforward, stressing the importance of carefully selecting the appropriate communication strategy (Soon *et al.*, 2019).

In conclusion, choosing between ACLs and standard method invocation should reflect application-specific requirements, weighing the benefits of flexibility and autonomy against implementation complexity and performance considerations, reflecting the importance of tailored computing strategies when developing multi-agent systems (Finin *et al.*, 1994; Woolridge, 2009).

References

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