Decentralized Workflows Using Vector Symbolic Architectures

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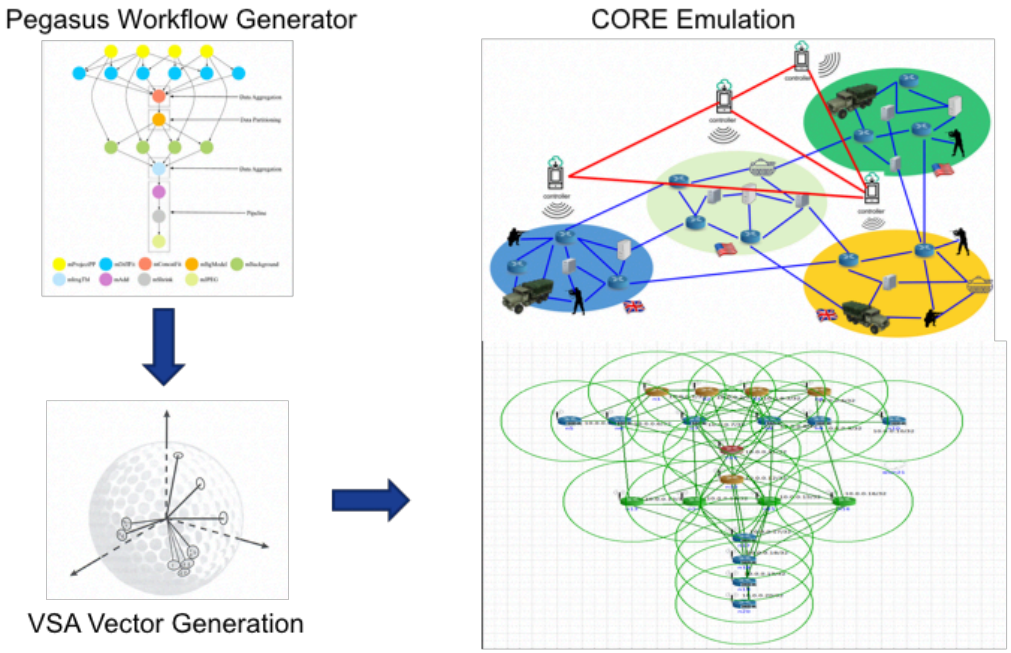
Scope:

Decentralized workflows require a means of specifying distributed data and computing control dependencies amongst services without the centralized coordination of the flow. Applying the state-of-the-art in workflow research—especially in dynamic coalition network environments—raises several technical challenges, for example:

- Obtaining a stable endpoint to deploy the service manager is impractical—if not impossible—due to the variable network
- connectivity associated with mobile endpoints (e.g.,unmanned autonomous systems);
- High latency and cost associated with communication (e.g.,satellite);and
- Poor infrastructure, especially absent back-end connectivity.

Consequently, in dynamic environments, a new class of workflow methodology is required—i.e., a workflow which operates in a decentralized manner. In this demonstration we show how such a decentralised workflow can be realized by making use of structured associative memory models called Vector Symbolic Architectures, from the artificial intelligence community.



Description:

The demonstration shows show how typical workflows - generated using the Pegasus workflow generator (https://confluence.pegasus.isi.edu/display/pegasus/WorkflowGenerator) - can be represented in the VSA method and how the resulting vectors control dynamically control the composition of the decentralized workflow. The demonstration uses the CORE network emulation environment to show how the VSA method can operate a representative dynamic wireless coalition network environment.

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