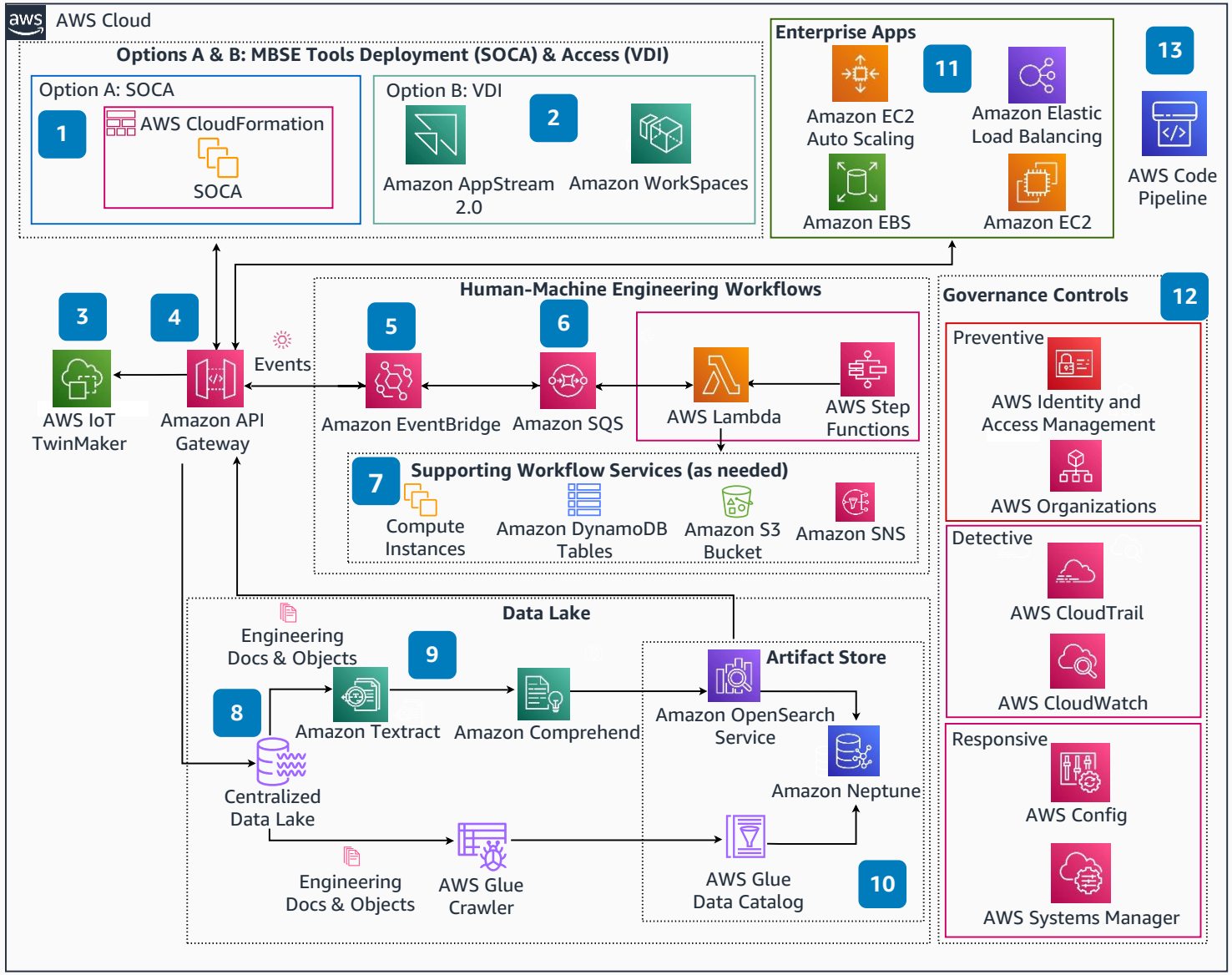
Guidance for Model-Based Systems Engineering (MBSE) on AWS

This architecture demonstrates the three options of implementing MBSE on AWS in addition to the data model connectivity from enterprise apps and lifecycle governance controls for permissioning, monitoring, and responding.



1. Use **AWS CloudFormation** to deploy **Scale-Out-Computing on AWS (SOCA)** and build a centralized engineering environment (e.g., high-performance computing [HPC] and virtual desktop infrastructure [VDI]), where you can deploy MBSE tool. Bring your own MBSE tools, or find them on **AWS Marketplace**. (Option A.)
2. Use **Amazon AppStream 2.0** for non-persistent VDI or **Amazon Workspaces** for persistent VDI to access MBSE tool. Bring your own MBSE tools, or find them on **AWS Marketplace**. (Option B.)
3. Use **AWS IoT TwinMaker** to create digital twins along with MBSE.
4. **Amazon API Gateway** is the center of communications among applications and environments. API-based microservices integrate new technologies and complementary services. **AWS AppSync** is also an applicable option.
5. Use **Amazon EventBridge** to trigger workflows based on all events, including MBSE.
6. **Amazon Simple Queue Service (Amazon SQS)** ensures the message is processed. **AWS Step Functions** builds state machine-based workflows executed by **AWS Lambda** functions.
7. Based on workflow selection, compute instances create ephemeral simulations; **Amazon DynamoDB tables** track engineering activities; **Amazon Simple Storage Service (Amazon S3)** stores objects (output files) in the bucket; and **Amazon Simple Notification Service (Amazon SNS)** performs team communications.
8. Store engineering documents and objects in a centralized data lake.
9. **Amazon Textract** and **Amazon Comprehend** extract text from documents. **Amazon OpenSearch Service** unlocks insights. **AWS Glue** crawls and catalogs data for engineering use cases. **Amazon Neptune** creates ontology and multi-domain relationship knowledge graphs for artifacts and users.
10. **Artifact store**, comprising **Amazon OpenSearch Service**, **AWS Glue Data Catalog**, and **Amazon Neptune**, feeds data back to MBSE tools on AWS via **Amazon API Gateway**.
11. **Amazon Elastic Compute Cloud (Amazon EC2) Auto Scaling**, **Amazon Elastic Load Balancing (ELB)**, **Amazon Elastic Block Store (Amazon EBS)**, and **Amazon EC2** deliver connectivity of heterogeneous enterprise apps and associated data models across design and operational environments.
12. **AWS** provides **lifecycle governance controls** for permissioning, monitoring, and responding. To enable data supply for the US Government, reference **Cross-Domain Solutions with AWS**.
13. **AWS CodePipeline** automates DevSecOps for continuous integration and continuous development (CI/CD) in MBSE workflows and operations.

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AWS Reference Architecture