

Learning Service Architecture

End-to-End System Overview

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Consolidated Overview

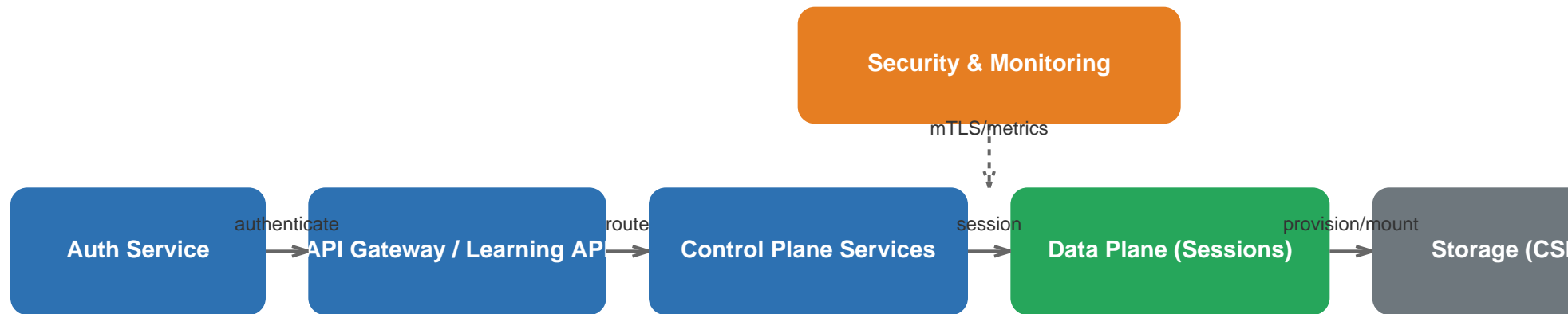


Figure 1: Consolidated end-to-end architecture overview with service-type legend

Learning Service Architecture (Control & Data Plane)

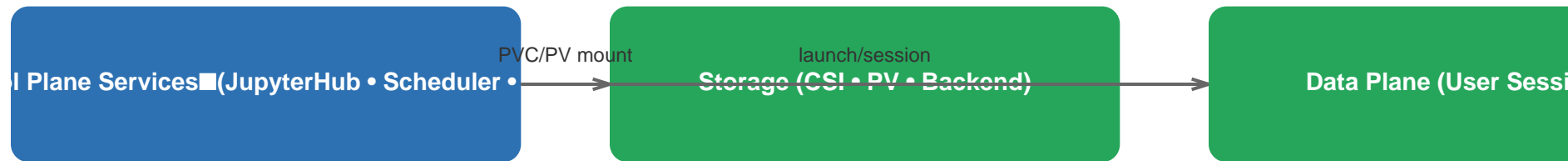


Figure 2: Control and data plane interactions for session lifecycle

User Registration & API Flow

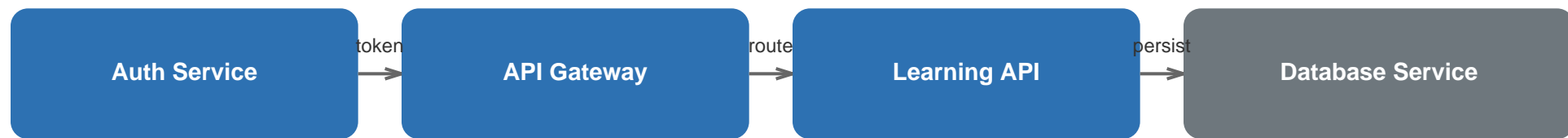


Figure 3: Registration and API request path with authentication and data persistence

Dynamic Volume Provisioning (CSI)



Figure 4: CSI-based dynamic volume provisioning and pod mount flow

Security & Isolation Model

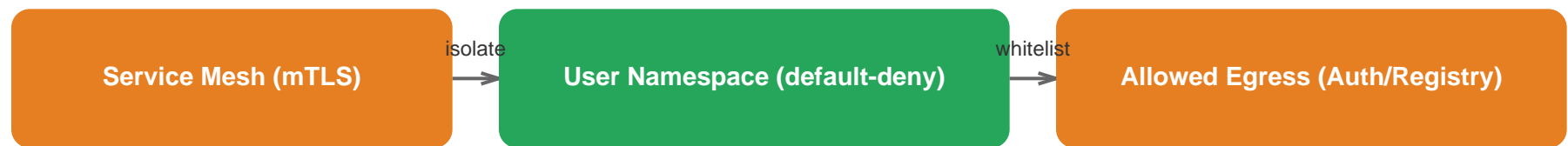


Figure 5: mTLS, namespace isolation, and restricted egress with whitelisted services

Slurm 2.0 Integration

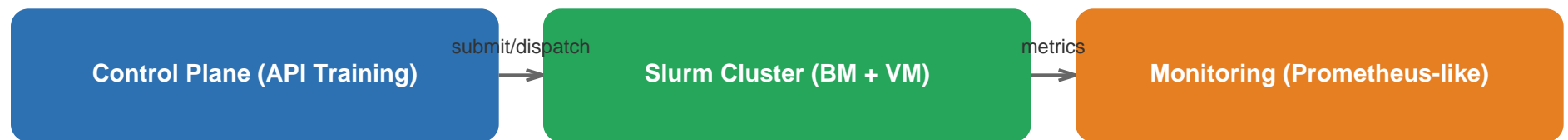


Figure 6: Unified AI/HPC scheduling via Slurm and centralized monitoring

Learning Launch Flow

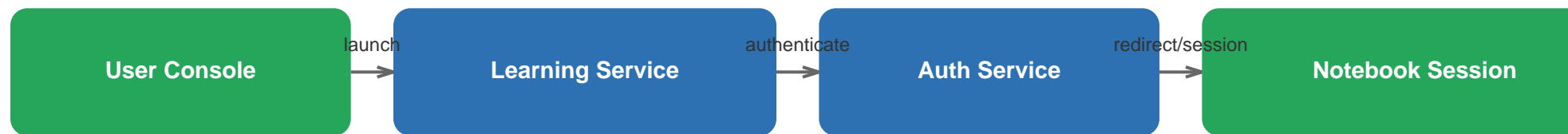


Figure 7: End-to-end launch sequence from console to authenticated session

Toolkit Image Management

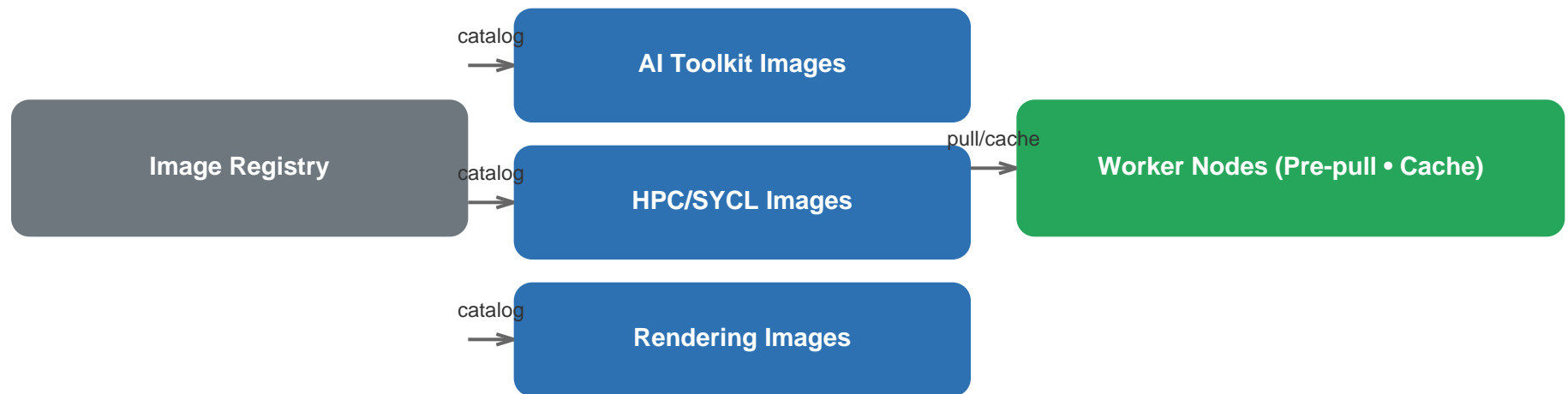


Figure 8: Containerized toolkits and pre-pull to worker nodes for performance

Architecture Insights & Benefits

- Scalable multi-tenant design across control and data planes
- Secure-by-default service mesh with namespace isolation
- Automated session and storage lifecycle via API and CSI
- Consistent, modular toolchains delivered via container images
- Unified monitoring and straightforward ops workflows