CCRE: Enterprise-Ready Core & Common Rule Engine Modernizing Rule Evaluation

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Summary Statement

CCRE (Core & Common Rule Engine) replaced a legacy AWS Neptune + Gremlin based rule engine with a high-performance, Java-native evaluator that enables secure, real-time decisioning across multiple data sources. The prior engine translated rule JSON into Gremlin queries executed against Neptune, creating recurring issues with brittle parsing, limited expressiveness, and tight coupling to a single datastore. CCRE removed that translation layer, introduced smart short-circuiting, rule definition caching, and rich evaluation logging, and unlocked personalization use cases that require real-time domain API data and strong security controls. The team completed end-to-end migration in under 3 months with no disruption to dependent services. CCRE delivers measurable outcomes including ~1M in cloud cost savings and the ability to evaluate thousands of rules in under ~30 ms, establishing an enterprise reusable foundation for eligibility, targeting, compliance checks, and decisioning.

Details

The legacy Neptune solution converted rule JSON to Gremlin and pushed logic into graph queries. Over time, the translation layer became a persistent burden: correctness of a full JSON to Gremlin parser was hard, troubleshooting was opaque across layers, and many rule patterns were difficult to express naturally. Execution was constrained to what could run efficiently in a graph database, limiting secure integration with real-time signals such as session context and domain APIs. CCRE redesigned evaluation as an in-application capability: rules are evaluated directly in Java while securely fetching only the minimum required attributes from approved sources. Smart short-circuiting and caching of rule definitions and metadata drive consistent low-latency decisions at scale, while auditable logs explain what was evaluated, what data was used, and why a decision was reached. CCRE also enabled treatment resolution and content enrichment patterns, creating a path to streamline content delivery and reduce dependence on external tools.

Outcomes

- **Financial impact:** ~1M reduction in cloud costs by reducing graph database execution and related overhead.
- **Performance at scale:** Thousands of rules evaluated in under ~30 ms, enabling real-time personalization and decisioning.
- **Delivery excellence:** Migration from the Neptune based engine to CCRE completed in less than 3 months with no disruption to dependent services.
- **Business enablement:** Unlocked high-profile journeys including Crypto / Alternative Investments, Workplace Investments use cases, and Beneficiary Missing, where real-time data and security boundaries were essential.
- **Enterprise readiness:** Deployed and proven in the Enterprise Personalization Platform, and intentionally designed as a Core & Common Rule Engine that can power and migrate any rule-evaluation use case across the enterprise. Standardized evaluation, secure multi-source data integration (domain APIs + session), caching, short-circuiting, and audit-ready logging provide a scalable one rule engine foundation and accelerate onboarding.