

# Fantasy World Simulator — Refined Game Design Document

Version 2.0 — Comprehensive Design Specification Project Code-name: Æternum

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## 1. Vision & Core Philosophy

### 1.1 What This Is

The Fantasy World Simulator is a procedural narrative engine that generates living fantasy worlds and simulates their evolution across centuries. Think of it as a **digital terrarium for civilizations** — the player seeds a world with initial conditions, then observes as thousands of interconnected systems produce emergent stories that no human author scripted.

The closest existing reference point is Dwarf Fortress’s Legends Mode, but this project diverges in several critical ways. Where Dwarf Fortress treats history generation as a preamble to fortress gameplay, this simulator treats the history itself as the primary content. Where Dwarf Fortress presents events as database entries, this simulator transforms them into literary prose. And where Dwarf Fortress gives the player no agency over unfolding history, this simulator intro-

duces a carefully constrained “cultivation” mechanic that lets the player nudge events without controlling them.

The result is a system that produces authentic-feeling fantasy narratives — complete with political intrigue, personal drama, magical catastrophes, religious upheaval, and generational sagas — that surprise even the person who built the world.

## 1.2 Design Pillars

**Emergent Storytelling Over Scripted Content.** No event in the simulation is hand-authored. Every coronation, betrayal, magical discovery, and holy war arises from the interaction of underlying systems. The design document does not contain a story — it contains the rules from which stories emerge. This means the simulator can produce narrative structures that the designer never anticipated, which is the entire point.

**Depth Over Breadth.** A single character in this simulator carries personal-ity traits, memories, goals, relationships, beliefs, possessions, skills, reputation, and a complete life history. A single city carries demographics, economy, architecture, political structure, religious composition, cultural traditions, and a timeline of every significant event that occurred within its walls. The simulator prefers to simulate fewer entities with rich interconnection over many entities with shallow data.

**Observation and Cultivation.** The player’s role is that of an invisible gardener tending a vast, living garden. They can water certain plants and prune others, but they cannot force a flower to bloom. The influence system is designed so that the player’s actions feel like nudges in a plausible direction rather than divine edicts. The most satisfying moments should come from watching a tiny intervention cascade into unforeseen consequences three centuries later.

**Believability Through Complexity.** A king does not declare war because a random number generator said so. He declares war because his personality traits include ambition and pride, because his economic advisors report declining trade revenue, because a neighboring kingdom insulted his wife’s lineage at a diplomatic banquet, because his military commander (who is secretly loyal to a rival faction) assures him victory is certain, and because a prophetic dream (sent by the player using influence points) convinced him that the gods favor his cause. Every event should have a traceable chain of causation that, when inspected, makes the player say “of course that happened.”

**Layered Interpretation.** The same events exist simultaneously as raw data entries (useful for analysis), structured event logs (useful for tracking), and literary prose (useful for immersion). The player can freely move between these layers, zooming from a statistical overview of a century-long population decline into the personal tragedy of a specific family caught in the famine that caused it.

### 1.3 The Experience in Practice

Imagine pressing “play” and watching the simulation advance year by year. In the event log, you notice a young scholar named Elara discovering an ancient artifact in a remote ruin. You click her name to inspect her — she is curious, ambitious, slightly reckless, and has a strained relationship with her mentor at the Ivory Academy who expelled her for unauthorized research. You bookmark her.

Fifty simulation-years later, the narrative panel describes a “Magical Renaissance” sweeping the continent. You trace the cause-effect chain backward and discover it leads to Elara’s artifact discovery. Her research paper spread to three kingdoms, inspired a generation of mages, led to the founding of a new academy, and produced court wizards who shifted the political balance of power. But you also notice that a religious order has declared magic heretical in response to the growing mage influence, and a charismatic paladin is gathering followers to wage a holy war against the arcane. The world is heading toward a schism that Elara set in motion without ever intending to — and you can trace every link in the chain.

That is the experience this simulator creates.

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## 2. The Simulation Loop

The simulation loop is the beating heart of the entire system. Every other feature — generation, rendering, narrative, player interaction — exists in service of this loop. Getting it right determines whether the world feels alive or mechanical.

### 2.1 Loop Architecture

The simulation operates on a **tick-based** model where one tick equals one day of in-world time. Not every system runs every tick. Instead, systems are stratified into frequency tiers based on how quickly their domain changes in the real world:

**Every tick (daily):** - Character AI decision-making (for active/nearby characters) - Military movement and tactical decisions - Event resolution queue processing - Urgent event cascading (battles, assassinations, natural disasters)

**Every 7 ticks (weekly):** - Trade caravan movement and market updates - Relationship maintenance calculations - Reputation propagation across social networks - Religious devotion updates

**Every 30 ticks (monthly):** - Economic production and consumption cycles - Population growth, birth, death, migration - Political stability assessments - Faction goal evaluation and strategy adjustment - Weather pattern generation

**Every 90 ticks (seasonal):** - Agricultural yield calculations - Military campaign strategic reassessments - Cultural trend propagation between connected civilizations - Seasonal festivals and traditions triggering

**Every 365 ticks (annually):** - Technological progress evaluation - Artistic and philosophical movement advancement - Language drift calculations - Generational shifts (new adults entering society, elders dying) - Geological micro-changes (erosion, river course shifts) - Divine power recalculation based on worshiper counts

**Every 3650 ticks (decadal):** - Long-term climate pattern shifts - Major geological events (volcanic eruptions, earthquakes) - Civilization-level cultural identity recalculation - Historical era transition checks

This stratification is not merely a performance optimization — it is a design choice. Economics should not fluctuate daily, and mountains should not erode monthly. The frequency tiers encode the natural tempo of each domain.

## 2.2 The Tick Execution Order

Within each tick, systems execute in a specific order that reflects causal dependency. A character cannot make a decision based on economic conditions that have not yet been calculated for that tick. The ordering is:

### TICK N BEGINS

1. TIME ADVANCE  
Increment world clock, check for season/year change  
Trigger any time-dependent scheduled events
2. ENVIRONMENT (if frequency matched)  
Weather generation for current day  
Geological events (volcanic, seismic)  
Natural disaster checks  
Resource regeneration (forests regrow, mines deplete)
3. ECONOMY (if frequency matched)  
Resource production at each site  
Trade route processing and caravan movement  
Market price recalculation (supply/demand)  
Tax collection and treasury updates  
Economic event generation (booms, busts)
4. POLITICS (if frequency matched)  
Faction leader decision-making  
Diplomatic action processing  
Internal stability calculation

Law and governance updates  
Succession and legitimacy checks

5. SOCIAL

Relationship updates between characters  
Reputation propagation through social networks  
Cultural norm enforcement and drift  
Family events (births, marriages, deaths)

6. CHARACTER AI

For each active character:

- Perceive: gather current context
- Evaluate: score possible actions
- Decide: select action based on personality
- Execute: perform action, generate events
- Remember: store significant outcomes in memory
- Reflect: update goals if context has changed

7. MAGIC (if frequency matched)

Magical research progress  
Mana/power level fluctuations  
Artifact activation and influence  
Magical institution internal politics  
Wild magic and planar stability checks

8. RELIGION (if frequency matched)

Divine power recalculation  
Prayer and devotion aggregation  
Divine intervention probability checks  
Church politics and schism progression  
Prophet and saint emergence checks

9. MILITARY

Army movement along planned routes  
Battle resolution for armies in contact  
Siege progression for ongoing sieges  
Recruitment and supply chain updates  
Morale calculations

10. EVENT RESOLUTION

Process event queue (ordered by priority)  
Execute consequence chains  
Generate cascading events from resolved events  
Update cause-effect graph

11. NARRATIVE GENERATION

```
For events above significance threshold:
  Generate raw log entry
  Generate narrative prose (template-based)
For events above high-significance threshold:
  Generate micro-narrative vignette
  Route to active chronicler for bias filtering
```

#### 12. CLEANUP & INDEXING

```
Update spatial index for moved entities
Archive old events to compressed storage
Recalculate Level-of-Detail boundaries
Update world fingerprint/DNA visualization
Process player influence queue
```

#### 13. PLAYER NOTIFICATION

```
Check notification preferences
Alert on bookmarked entity events
Alert on high-significance global events
Update UI state for renderer
```

TICK N COMPLETE

### 2.3 Level-of-Detail Simulation

Not every entity in the world can be simulated at full fidelity every tick — a Large (800×800) world might contain tens of thousands of characters. The Level-of-Detail (LoD) system manages computational budget by simulating entities at different fidelity levels based on proximity to the player's focus.

**Full Detail (Focus Zone — ~50 tile radius):** Every character makes daily decisions. Individual relationship changes are tracked. Economic transactions are itemized. Military movements are tracked per-unit. Events are generated at maximum granularity. This is where the player is looking, so this is where the simulation is most alive.

**Reduced Detail (Active Zone — ~200 tile radius):** Characters are simulated in aggregate groups. Economic changes are calculated per-settlement, not per-merchant. Military forces are tracked as armies, not individual soldiers. Only events above a moderate significance threshold are generated. The simulation is still running, but at lower resolution.

**Abstract (Background Zone — beyond 200 tiles):** Entire civilizations are simulated as statistical aggregates. Population growth/decline is a formula, not individual births and deaths. Wars are resolved as probability calculations, not battle simulations. Only events above a high significance threshold are gen-

erated. This zone provides the “rest of the world is still happening” backdrop.

**Dynamic Focus Shifting:** When the player moves their focus to a new area, the LoD boundaries shift with them. Entities transitioning from Abstract to Full Detail undergo a “detail inflation” process where their statistical aggregate state is decomposed into individual entities with plausible histories interpolated from the aggregate trends. This creates the illusion that the full-detail simulation was always running.

**Significance Override:** Regardless of LoD zone, any event above a configurable significance threshold (default: 85/100) always receives full-detail simulation. If a dragon attacks a city in the Background Zone, the system temporarily promotes that area to Full Detail for the duration of the crisis.

## 2.4 The Event Queue

Events are the primary output of the simulation loop and the primary input to the narrative engine. The event queue is a priority queue ordered by significance, with higher-significance events processed first within each tick.

Each event carries: - A **significance score** (0–100) that determines narrative treatment depth - A **category** (Political, Magical, Cultural, Religious, Scientific, Personal, Exploratory, Economic, Disaster, Military) - A **participant list** of entity IDs involved - A **cause chain** linking back to the events that produced this one - A **consequence potential** — a set of possible follow-on events with probability weights - A **temporal offset** — some consequences are immediate, others are delayed by days, months, or years

The queue processes events in significance order, and each resolved event may enqueue new events. This creates the cascading chains that produce emergent narrative depth.

## 2.5 Simulation Speed and Player Experience

The player controls simulation speed through time manipulation:

**Pause** — simulation frozen, player can inspect anything, plan influence actions.

**Normal Speed (1 day/second)** — useful for watching specific events unfold in real-time. A battle might take 3-5 real seconds. A political negotiation might take 10-15 seconds. This is “watching a scene play out” speed.

**Fast Forward  $\times 7$  (1 week/second)** — useful for watching a season unfold. Crop cycles, military campaigns, trade missions become visible at this speed. Good for tracking a specific character’s month-to-month life.

**Fast Forward  $\times 30$  (1 month/second)** — useful for watching a year unfold. Economic cycles, political terms, seasonal patterns become visible. Good for tracking a single conflict or political crisis.

**Fast Forward ×365 (1 year/second)** — useful for watching decades pass. Generational change, cultural drift, territorial expansion/contraction visible. Good for watching civilizations rise and fall.

**Ultra Fast ×3650 (1 decade/second)** — useful for watching centuries compress. Geological changes, language evolution, the full arc of empires. Reserved for “what happens if I let this run for a thousand years” curiosity.

**Slow Motion (10 seconds/day)** — triggered automatically or manually for momentous events. The coronation of a new monarch, the critical moment of a decisive battle, the discovery of a world-changing artifact. Events are narrated in extended prose with more literary detail.

**Automatic Slow-Down:** The simulation can optionally slow itself when it detects a convergence of significant events. If three major plotlines are reaching climax simultaneously — a war is about to be decided, a succession crisis is erupting, and a magical catastrophe is unfolding — the simulation drops to Slow Motion so the player can absorb the narrative density.

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### 3. World Generation Pipeline

World generation follows a six-phase pipeline where each phase builds on the output of the previous one. The pipeline is deterministic given a seed value, meaning the same seed and parameters always produce the same world.

#### 3.1 Generation Parameters

The player configures the world through a parameter screen before generation begins. Each parameter has discrete named settings to avoid overwhelming the player with sliders:

**World Size** — determines the map grid dimensions and, consequently, the maximum number of civilizations and the scale of geography. - Small (200×200): Intimate setting, 2-4 civilizations, faster simulation. Good for character-focused stories. - Medium (400×400): Standard setting, 4-8 civilizations, balanced scope. The recommended starting size. - Large (800×800): Grand setting, 8-16 civilizations, continental scope. For those who want epic-scale history. - Epic (1600×1600): Massive setting, 16-32 civilizations, multiple continents. For dedicated sessions and powerful hardware.

**Magic Prevalence** — controls how common magical phenomena, practitioners, and artifacts are. - Mundane: Magic is essentially myth. No active practitioners, maybe a few dormant artifacts. Stories focus on politics, warfare, and human drama. - Low: Magic exists but is rare and feared. A handful of practitioners per civilization. Magical events are momentous. - Moderate: Magic is an established part of society. Academies exist, court wizards are common, magical creatures roam wild places. The default “fantasy” setting. - High: Magic permeates daily



life. Enchanted tools are commonplace, magical transportation exists, wars are fought with spells as much as swords. - Ubiquitous: Magic is as fundamental as physics. Non-magical solutions to problems are the exception. Reality itself is fluid in places. This setting produces the most alien and unpredictable worlds.

**Civilization Density** — affects the number and distribution of initial sentient settlements. - Sparse: Few settlements, vast wilderness. Civilizations are isolated and develop independently. - Normal: Balanced distribution. Some contact between civilizations, some untamed wilderness. - Dense: Many settlements, little wilderness. Civilizations are in constant contact, leading to more frequent diplomacy, trade, and conflict. - Crowded: Settlements everywhere, overlapping territorial claims. Conflict is nearly inevitable. The “pressure cooker” setting.

**Danger Level** — controls the frequency and severity of threats. - Peaceful: Rare monsters, mild disasters, low conflict frequency. Stories focus on cultural development and personal drama. - Moderate: Occasional monster incursions, periodic natural disasters, wars happen but are not constant. - Dangerous: Frequent monster attacks, regular natural disasters, wars are common. Heroes and villains are forged in constant crisis. - Apocalyptic: The world is actively hostile. Existential threats emerge regularly. Civilizations struggle to survive. This setting produces the most dramatic but shortest histories.

**Historical Depth** — how many years of pre-history the simulator runs before the player begins observing. - Shallow (100 years): Living memory. Current events are well-documented, the past is recent. Suitable for “founding era” stories. - Moderate (500 years): Several generations. Some history is recorded, some is legend. The default setting. - Deep (2000 years): Multiple eras. Ancient empires have risen and fallen. Rich backstory with mythological layers. - Ancient (10000 years): Deep time. Multiple cycles of civilization, layers of ruins, forgotten technologies. Produces the richest lore but takes longer to generate.

**Geological Activity** — controls the dynamism of the physical world during simulation. - Dormant: Terrain changes very slowly. Rivers stay where they are, mountains don’t grow or erode meaningfully. - Normal: Occasional earthquakes, rare volcanic eruptions, gradual erosion. The physical world is a stable backdrop. - Active: Regular seismic events, active volcanoes, rivers that flood and shift. Geography is a active participant in history. - Volatile: Frequent catastrophic geological events. The map itself is a character. Civilizations must constantly adapt or die.

**Race Diversity** — number and variety of sentient species. - Homogeneous (1-2): Humans and perhaps one other race. Conflict is between cultures, not species. - Standard (3-5): Classic fantasy spread — humans, elves, dwarves, and a couple of unique races. Good default. - Diverse (6-10): Many races with distinct cultures. Inter-species diplomacy is a major theme. - Myriad (11+): The world teems with sentient species. Ecology is complex, politics are multi-dimensional, and alliances shift constantly.

**Pantheon Complexity** — depth of the divine layer. - Atheistic: No gods. Religion is cultural tradition without divine power. Suitable for “grounded” fantasy. - Deistic: Gods exist but do not intervene. Religion is important culturally but gods are distant. - Theistic: Gods are real and occasionally act. Miracles happen. Prophets receive genuine visions. - Interventionist: Gods are active participants. Divine wars spill into the mortal world. Religion is politics with supernatural backing.

**Technology Era** — the starting technological level of civilizations. - Stone Age: Pre-metalworking. Tribal societies, oral traditions, stone tools. - Bronze Age: Early metalworking, first cities, early writing. Civilization is young. - Iron Age: Widespread metalworking, established kingdoms, written law. The classic medieval fantasy starting point. - Renaissance: Early modern technology, printing, gunpowder. Magic and technology compete.

### 3.2 Generation Phases

**Phase 1 — Geological Formation.** The generator creates the physical world. Tectonic plates are simulated — their collision produces mountain ranges, their separation creates ocean rifts and volcanic island chains. A heightmap is generated using Perlin noise modulated by plate tectonics. Water flows downhill from mountain peaks, carving rivers that pool into lakes and empty into oceans. Climate zones are calculated from latitude, elevation, and ocean proximity. Temperature and rainfall combine to determine biome type for each tile. Finally, mineral and resource nodes are placed based on geological logic — gold in quartz veins near volcanic activity, iron in sedimentary layers, magical crystals at ley line intersections.

**Phase 2 — Ecological Seeding.** The bare geological map receives life. Flora is distributed by biome — deciduous forests in temperate zones, conifers in cold highlands, grasses on plains, cacti in deserts. Fauna follows flora — herbivores where food grows, predators where herbivores congregate. Magical creatures receive territories based on magic prevalence — dragons in remote mountain ranges, fey in ancient forests, elementals near ley line nodes. Dungeon and ruin sites are placed in geologically interesting locations (cave systems, ancient volcanic calderas, cliff faces) to be populated with history during Phase 5.

**Phase 3 — Cosmological Framework.** The metaphysical rules of the world are established. A pantheon of gods is generated, each with domains (war, knowledge, nature, death, love, craft, storms, etc.), personality traits, and relationships to other gods (allies, rivals, lovers, parent-child). The magic system’s rules are defined — which schools of magic exist, what power sources fuel them, what the limitations and costs are. The planar structure is established — how many planes exist beyond the material world, what lives there, and how permeable the boundaries are. These cosmological constants constrain everything that follows.

**Phase 4 — Racial Genesis.** Sentient species are created with unique phys-

ical characteristics, lifespans, cultural tendencies, and innate abilities. Each race receives a procedurally generated creation myth that fits within the established cosmological framework. Racial naming conventions are established using Markov chain generators trained on culturally-inspired phoneme distributions — so elven names feel different from dwarven names, which feel different from orcish names, and all names within a culture feel linguistically consistent. Starting populations are distributed based on biome affinity (mountain-dwelling races in mountains, forest-dwelling races in forests).

**Phase 5 — Pre-History Simulation.** This is where the generator transitions from static placement to dynamic simulation. The simulation engine from Section 2 is run in fast-forward mode at reduced fidelity for the configured Historical Depth. During this phase, ancient empires rise and fall, legendary heroes perform great deeds, artifacts are forged during significant events, wars are fought that leave ruins and grudges, religions splinter and merge, and languages diverge from common ancestors. The output of this phase is the world’s backstory — not hand-authored, but simulated.

**Phase 6 — Current State Initialization.** The fast-forwarded simulation halts, and the current state is “crystallized” into the world the player will observe. Active civilizations are established with governments, economies, militaries, and cultures derived from their simulated history. Named characters are generated in positions of power and significance, each with a personal history that connects to the world’s history. Political structures reflect centuries of evolution. Cultural traditions, holidays, taboos, and art styles are codified. Initial tensions — border disputes, succession crises, religious conflicts, trade rivalries — are seeded from the pre-history’s unresolved threads.

### 3.3 Post-Generation Refinement

After generation completes, the player enters a refinement interface where they can adjust the world before simulation begins. This is the one moment of direct control the player receives — once simulation starts, they are limited to the influence system. Refinement options include moving or resizing civilization territories, adjusting starting populations, creating or removing key characters with custom traits, establishing initial alliances or conflicts, placing special landmarks or artifacts, modifying climate zones, and seeding specific events to trigger early in the simulation. This lets the player set up interesting initial conditions without scripting outcomes.

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## 4. Entity Architecture

### 4.1 Entity-Component-System (ECS) Design

Every object in the simulation — from a mountain range to a single peasant — is an entity. An entity is nothing but a unique identifier

(a branded TypeScript type for compile-time safety). All data lives in components, and all logic lives in systems. This architectural pattern enables maximum flexibility: a character who becomes a lich gains an `UndeadComponent` without requiring a new entity type. A city that falls to ruin loses its `PopulationComponent` and `GovernmentComponent` but retains its `PositionComponent` and `HistoryComponent`.

## 4.2 Entity Categories and Their Components

**Geographic Entities:** - **Regions:** `PositionComponent`, `BiomeComponent`, `ClimateComponent`, `OwnershipComponent`, `ResourceComponent` - **Sites (cities, towns, villages, ruins):** `PositionComponent`, `PopulationComponent`, `EconomyComponent`, `GovernmentComponent`, `MilitaryComponent`, `StructuresComponent`, `HistoryComponent`, `CultureComponent` - **Structures (buildings, monuments):** `PositionComponent`, `StructureTypeComponent`, `ConditionComponent`, `HistoryComponent` - **Natural Features (rivers, mountains, caves):** `PositionComponent`, `FeatureTypeComponent`, `ResourceComponent`, `MagicalPropertyComponent` (if applicable)

**Social Entities:** - **Civilizations:** `TerritoryComponent`, `GovernmentComponent`, `EconomyComponent`, `MilitaryComponent`, `CultureComponent`, `DiplomacyComponent`, `HistoryComponent`, `PopulationDemographicsComponent` - **Factions (guilds, secret societies, orders):** `MembershipComponent`, `GoalComponent`, `ResourceComponent`, `InfluenceComponent`, `HistoryComponent`, `ReputationComponent` - **Families:** `GenealogyComponent`, `WealthComponent`, `ReputationComponent`, `TraitsComponent` (hereditary tendencies), `GrudgesComponent` - **Organizations (academies, churches):** `MembershipComponent`, `KnowledgeComponent`, `ResourceComponent`, `HierarchyComponent`, `DoctrineComponent`

**Individual Entities:** - **Characters:** `PositionComponent`, `AttributeComponent`, `SkillComponent`, `PersonalityComponent`, `RelationshipComponent`, `GoalComponent`, `MemoryComponent`, `BeliefComponent`, `PossessionComponent`, `ReputationComponent`, `StatusComponent`, `HealthComponent` - **Creatures:** `PositionComponent`, `CreatureTypeComponent`, `TerritoryComponent`, `BehaviorComponent`, `ThreatLevelComponent` - **Deities:** `DomainComponent`, `PersonalityComponent`, `RelationshipComponent` (to other gods), `PowerComponent` (derived from worshipers), `InterventionHistoryComponent`

**Cultural Entities:** - **Religions:** `DoctrineComponent`, `WorshiperComponent`, `HolySiteComponent`, `SchismHistoryComponent`, `RitualComponent` - **Traditions:** `OriginComponent`, `PracticeComponent`, `SpreadComponent`, `EvolutionHistoryComponent` - **Languages:** `PhonemeComponent`, `VocabularyComponent`, `ParentLanguageComponent`, `SpeakerDistributionComponent` - **Arts:** `StyleComponent`, `InfluenceComponent`, `MasterworkListComponent`, `PatronageComponent`

**Knowledge Entities:** - **Books:** `AuthorComponent`, `ContentComponent`,

InfluenceComponent, LocationComponent (where copies exist), PreservationStateComponent - **Discoveries:** DiscovererComponent, DomainComponent, ImpactComponent, SpreadComponent - **Spells:** CreatorComponent, SchoolComponent, PowerLevelComponent, RequirementComponent, UserListComponent

**Object Entities:** - **Artifacts:** CreationHistoryComponent, PowerComponent, OwnershipChainComponent, CurseComponent (if applicable), LocationComponent, SignificanceComponent - **Treasures:** ValueComponent, LocationComponent, GuardianComponent, OwnershipComponent

**Event Entities:** - **Wars:** ParticipantComponent, CauseComponent, BattleListComponent, OutcomeComponent, TerritoryChangeComponent - **Disasters:** TypeComponent, SeverityComponent, AffectedAreaComponent, CasualtyComponent, RecoveryComponent - **Celebrations:** TypeComponent, ParticipantComponent, LocationComponent, CulturalImpactComponent

### 4.3 Branded ID Types

To prevent accidentally passing a CharacterId where a FactionId is expected, all entity IDs use TypeScript's branded type pattern:

```
type EntityId = number & { readonly __brand: 'EntityId' };
type CharacterId = EntityId & { readonly __character: true };
type FactionId = EntityId & { readonly __faction: true };
type SiteId = EntityId & { readonly __site: true };
type ArtifactId = EntityId & { readonly __artifact: true };
type EventId = EntityId & { readonly __event: true };
type DeityId = EntityId & { readonly __deity: true };
type BookId = EntityId & { readonly __book: true };
```

This catches entire categories of bugs at compile time.

---

## 5. Simulation Systems — Deep Design

Each simulation system operates as an independent module that reads relevant components, processes logic, and writes back updated state plus generated events. Systems should never directly reference other systems — they communicate exclusively through the event queue and shared component state.

### 5.1 Character AI System

The Character AI is the most complex system and the primary driver of emergent narrative. Every named character in the simulation is an autonomous agent with the following decision-making pipeline:

**Perception Phase.** The character “perceives” their current context. This is not literal sensory simulation — it is a contextual awareness check. A character knows: their current location and what is happening there, the state of their personal relationships, the political situation of their faction, recent events that affected them or their community, their own health/wealth/power status, and any information they have learned through their social network (which may be incomplete or wrong, per the Memory & Reputation system).

**Goal Evaluation Phase.** The character reviews their active goals and assesses progress. Goals exist in a priority hierarchy:

- *Survival goals* (highest priority): avoid death, escape danger, find food/shelter. These override everything.
- *Primary life goal* (chosen based on personality): gain power, seek knowledge, protect family, accumulate wealth, achieve glory, pursue art, serve faith, find love.
- *Secondary goals* (contextual): fulfill duty to faction, advance in organization, complete a specific project, resolve a personal conflict.
- *Opportunistic goals* (lowest priority): take advantage of unexpected situations, explore curiosity, socialize.

Goals can change over a character’s lifetime. A young character driven by glory-seeking might, after losing a child to war, shift their primary goal to protecting family. A scholar who discovers forbidden knowledge might shift from seeking knowledge to gaining power. These shifts are driven by significant life events interacting with personality traits.

**Action Generation Phase.** Based on the current context and active goals, the system generates a list of possible actions. Actions are drawn from a context-dependent pool. A character in a royal court has different available actions than a character in a dungeon. Actions include: diplomatic overtures, military commands, scholarly research, crafting/building, social interaction (befriend, betray, romance, intimidate), travel, economic activity (trade, invest, steal), religious acts (pray, proselytize, perform ritual), magical acts (research spell, enchant item, summon creature), and many more.

**Scoring Phase.** Each candidate action is scored by a weighted formula:

```
score = (personality_alignment × 0.3)
        + (goal_advancement × 0.3)
        + (relationship_impact × 0.15)
        + (risk_assessment × 0.10)
        + (opportunity_value × 0.10)
        + (cultural_conformity × 0.05)
        + (random_factor × impulsiveness_trait)
```

The `personality_alignment` score measures how well the action fits the character’s trait profile. A cruel character scores “show mercy” low; a scholarly character scores “research ancient text” high. The `goal_advancement` score

measures how much the action moves the character toward their primary and secondary goals. The `relationship_impact` considers how the action affects relationships with people the character cares about. The `risk_assessment` weighs potential negative outcomes against the character’s bravery/caution traits. The `cultural_conformity` score reflects whether the action aligns with the character’s cultural norms (a character from a culture that values honor scores “flee from battle” low even if survival logic says it’s wise).

The `random_factor` is scaled by the character’s impulsiveness trait. A deliberate, patient character adds almost no randomness. An impulsive, passionate character might occasionally do something suboptimal because it “felt right in the moment” — which produces much more interesting stories.

**Execution Phase.** The highest-scoring action is executed. Execution generates one or more events that are placed in the event queue. The event includes the character as a participant, the action as the event subtype, and the outcome (which may involve a probability roll modified by relevant skills).

**Memory Phase.** The character’s memory system records the action and its outcome. Significant outcomes — especially failures, betrayals, great successes, or emotional moments — receive higher memory weight and persist longer. See Section 6 for the full Memory & Reputation system.

**Reflection Phase.** After execution, the character briefly “reflects” — checking whether the outcome suggests their goals or strategies should change. A general who loses a battle might reconsider the war. A scholar who makes a breakthrough might set more ambitious research targets. A lover who is rejected might shift attention to career advancement. This creates character arcs over time.

## 5.2 Faction & Political System

Factions are the largest-scale agents in the simulation, representing civilizations, kingdoms, guilds, religious orders, and any organized group with shared goals. Unlike characters, factions do not have a single decision-making process — instead, faction behavior emerges from the interactions of the characters who lead them.

**Government Structures** define how decisions are made within a faction:

- *Monarchy*: A single ruler makes all major decisions. Their personality drives faction behavior. Succession follows rules (primogeniture, elective, etc.) that can themselves change.
- *Republic*: A council or senate votes on major decisions. Individual councilors have their own agendas. Majority personality profiles shape faction direction.
- *Theocracy*: Religious leaders make decisions based on divine doctrine. Orthodoxy vs. reform tensions drive internal politics.

- *Tribal Confederation*: Multiple chieftains must agree. Consensus-building is slow but stable. Charismatic leaders can dominate.
- *Oligarchy*: A small group of wealthy/powerful individuals steer faction policy. Economic interests dominate.
- *Magocracy*: Magical ability determines political power. Research and arcane achievement replace military strength as currency.

**Diplomacy Engine.** Factions interact through a diplomacy system that processes the following action types: form alliance (requires mutual benefit assessment), declare war (requires casus belli or reckless leader), propose trade agreement (requires compatible economies), arrange royal marriage (requires eligible individuals and political motivation), offer tribute (weaker faction to stronger), issue ultimatum (demands backed by threat), sign peace treaty (requires both sides willing), form coalition (against a common threat).

Diplomatic actions are proposed by faction leaders (using the Character AI system), evaluated by advisors (also characters with their own biases), and resolved based on faction interests modified by the personalities of the negotiators. A skilled diplomat character can achieve outcomes that pure power calculation would not predict — or a hotheaded ambassador can ruin a promising alliance.

**Internal Politics.** Within each faction, named characters compete for power, influence, and resources. Noble houses accumulate wealth and form alliances. Ambitious generals plot coups. Reform movements challenge established order. Corruption erodes institutional effectiveness. Succession crises erupt when rulers die without clear heirs. All of this is driven by the Character AI system — internal politics is simply what happens when you simulate dozens of ambitious characters within the same power structure.

### 5.3 Economic System

The economy provides the material foundation that all other systems rest on. Armies need food and weapons, scholars need books and laboratories, kings need treasuries to fund ambitions.

**Resource Production.** Each settlement produces resources based on its terrain (farmland produces food, mines produce ore, forests produce timber), technology level (better tools = more output), workforce size (more people = more production, with diminishing returns), and specialization (a city famous for its smiths produces more weapons per worker than a generic city).

**Trade Networks.** Trade routes connect settlements. Caravans and merchant ships move goods along these routes, buying where prices are low and selling where prices are high. Route safety affects trade volume — a road through bandit-infested territory sees less traffic. Trade routes are emergent: the system does not predefine them but rather models merchant entities making profit-seeking decisions about where to buy and sell. Over time, consistently profitable routes become “established trade routes” with better infrastructure and lower



risk.

**Market Simulation.** Each settlement has a local market with prices determined by supply and demand. A city that produces abundant iron but little food has cheap iron and expensive food, creating trade incentives. Prices respond to events — a war that disrupts grain shipments causes food prices to spike in import-dependent cities. A magical discovery that makes enchanted tools commonplace reduces tool prices but increases demand for magical components.

**Economic Events.** The system generates economic events that feed into the narrative: booms (resource discovery, trade route opening), busts (market crashes, resource depletion), monopolies (faction controlling critical resource), innovation (new production methods, usually tied to discoveries), and crises (inflation, currency collapse, debt defaults).

#### 5.4 Military & Warfare System

Warfare is the most dramatic expression of faction rivalry and produces some of the simulation's most significant events.

**Army Composition.** Armies are composed of units drawn from a faction's population and resources. Unit types include infantry, cavalry, archers, siege engineers, mages (if magic prevalence allows), and special units unique to certain races or cultures. Army size is limited by faction population, economic capacity to supply and equip, and morale/loyalty of the populace.

**Campaign System.** Wars are not single battles — they are multi-step campaigns with strategic objectives. A faction might campaign to capture a specific city, to secure a resource-rich territory, or to eliminate a rival's military capacity. Campaign planning is done by commander characters (using the Character AI system), so a brilliant strategist commands differently than a cautious bureaucrat.

**Battle Resolution.** When opposing armies meet, a battle is resolved through a multi-factor calculation: - Army size and composition (numbers matter, but are not everything) - Commander skill and tactics (a great general can overcome numerical disadvantage) - Terrain (defending a mountain pass against a larger force is viable) - Supply state (hungry armies fight poorly) - Morale (demoralized armies rout; fresh troops hold) - Magical support (battle mages, enchanted weapons, divine blessings) - Individual hero interventions (a legendary warrior can turn a battle's tide) - Weather (rain favors defenders, fog favors the attacker)

The resolution is not a single dice roll — it is a simulation of the battle's key moments, producing a narrative of charges, flanking maneuvers, heroic stands, routs, and surrenders that feeds into the event log.

**Siege Mechanics.** Cities with walls can be besieged rather than assaulted directly. Sieges are attritional — the attacker tries to starve the city while

the defender tries to hold out for reinforcements. Siege events include: assault attempts, sally attacks by defenders, disease outbreaks in cramped conditions, tunneling, magical bombardment, negotiated surrenders, and relief forces arriving.

**Post-War Consequences.** A war’s resolution cascades into all other systems. Territory changes (political system), reparation payments (economic system), veteran characters with new skills and trauma (character system), war-inspired art and literature (cultural system), religious interpretations of the outcome (religious system), and generational grudges (memory system).

## 5.5 Magic System Simulation

Magic, when enabled, is not merely a “combat power” — it is a force that reshapes society, economy, politics, and culture.

**Magical Research.** Wizard characters (and other practitioners) pursue research that can produce new spells, magical theories, and artifacts. Research is modeled as a long-term project with periodic progress checks. The probability of a breakthrough depends on the researcher’s skill, their available resources (library access, rare materials), their research environment (a well-funded academy vs. a lonely tower), and serendipity (lucky characters sometimes make unexpected connections).

**Magical Institutions.** Academies, orders, and covens are organizational entities with internal politics. The headmaster of a magic academy might favor certain schools of magic over others, creating disgruntled faculty who leave to found rival institutions. A witch coven might schism over the ethics of necromancy. These internal dynamics produce events and shape which magical knowledge is developed and taught.

**Artifact Creation.** Artifacts are not randomly generated loot — they are forged during significant magical events by specific characters for specific purposes. The Sundering Blade was created by the god Vulkaron during the Celestial War. The Staff of the Void was crafted by Mordain the Shadowweaver after he defeated a being from the shadow realm. Each artifact has a creation story that connects to the world’s history, and artifacts influence events they are involved in (a general wielding a legendary sword gets a morale bonus for their army and a personal combat bonus).

**Magical Catastrophes.** When magical research goes wrong, or when too much magical energy concentrates in one place, catastrophes occur. Wild magic zones distort reality in unpredictable ways. Planar rifts allow creatures from other planes to invade. Failed lich transformations produce undead horrors. Magical plagues spread through populations with unusual symptoms. These catastrophes produce some of the most dramatic events in the simulation and often catalyze major historical turning points.

**Magic and Society.** The integration (or rejection) of magic into society is a

dynamic process that the simulation models. In a High Magic world, enchanted items might be mass-produced, creating an economic revolution. In a Low Magic world, practitioners might be feared and persecuted. The balance between magical and mundane power is a political fault line that produces schisms, wars, and cultural movements.

## 5.6 Religious Simulation

Religion in the simulation is more than cultural flavor — when Pantheon Complexity is Theistic or Interventionist, gods are real entities with agency.

**Divine Power.** Each deity has a Power score derived from the number and devotion of their worshipers. More worshipers = more power. This creates an evolutionary dynamic: gods whose doctrines attract followers grow stronger, while gods whose doctrines lose relevance fade. A god can die if they lose all worshipers — and this is a significant event that produces theological crisis.

**Divine Intervention.** When a god’s power exceeds a threshold, they can intervene in the mortal world. Interventions include: empowering a chosen champion, sending prophetic visions, manifesting physically (rare, expensive in divine power), blessing a site or army, cursing an enemy, creating a miracle that validates their faith. The frequency and intensity of interventions depends on the Pantheon Complexity setting.

**Church Politics.** Religious institutions are organizational entities with human leaders, and human leaders have human failings. Corruption, power struggles, schisms over doctrine, and reform movements are all modeled. A schism occurs when a significant portion of a religion’s leadership disagrees on a doctrinal point — both sides claim to be the true faith, and followers must choose. Schisms can produce religious wars.

**Syncretism.** When civilizations with different religions interact through trade or conquest, their religions influence each other. A conquered people might adopt their conqueror’s gods while retaining their own traditions, creating a syncretic blend. A trade partner’s god of prosperity might gain worshipers in a merchant city even though the city’s dominant religion doesn’t include that god. This produces realistic religious evolution over centuries.

## 5.7 Cultural Evolution System

Culture is the slow-moving backdrop against which the faster drama of politics and warfare plays out. Cultural systems operate at lower frequency (seasonal and annual ticks) but produce the deepest long-term changes.

**Technological Progress.** Inventions emerge from researcher characters (or are discovered by explorers finding ancient knowledge). Each invention has prerequisites — the printing press requires both woodworking and literacy. Once invented, technology spreads through trade contacts and cultural exchange at a rate dependent on the recipient civilization’s openness and the technology’s

utility. Some technologies are suppressed — a theocracy might ban the printing press to maintain doctrinal control.

**Artistic Movements.** Art in the simulation is not merely decorative — it reflects and shapes the culture that produces it. An artistic movement arises when a masterwork (produced by an artist character) resonates with the current cultural moment. If a civilization has just won a great war, an epic poem glorifying the victory can spark a “heroic movement” in literature and visual art. If a civilization is undergoing religious upheaval, abstract spiritual art might emerge. Movements spread between connected civilizations, creating shared aesthetic vocabulary.

**Philosophical Schools.** Philosophers are characters who generate ideas. Their ideas compete in the marketplace of thought, gaining followers who spread them. Some ideas are conservative (defending existing power structures) and others are revolutionary (challenging them). The balance between conservative and revolutionary philosophy in a civilization affects its stability, openness to change, and likelihood of reform or revolution.

**Language Evolution.** Languages in the simulation are not static labels — they are entities that evolve over time. A common language splits into dialects when its speakers are separated by geography or politics. Over centuries, dialects become mutually unintelligible languages. Trade contact introduces loan words. Conquest can impose a new language on a population, creating a linguistic underclass. Scholarly traditions preserve ancient languages that have otherwise died, creating an “academic” language used in writing but not in speech (like Latin in medieval Europe).

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## 6. Character Memory & Reputation System

This system transforms characters from reactive decision-makers into beings with persistent inner lives. It is the foundation for grudges, gratitude, learning from experience, and the rich personal histories that make characters feel real.

### 6.1 Memory Architecture

Every named character maintains a **Memory Store** — an ordered collection of memory records, each representing a significant experience. Memories are not a complete recording of everything that happens — they are selective, weighted, and subject to decay.

#### Memory Record Structure:

```
Memory {  
    eventId:      EventId      // The original event  
    timestamp:    WorldTime    // When it happened  
    emotionalWeight: number    // -100 (traumatic) to +100 (joyful)
```

```

significance:    number           // 0-100, how important was this
participants:   EntityId[]       // Who was involved
myRole:         MemoryRole       // Was I the actor, target, or witness?
category:       MemoryCategory   // Betrayal, kindness, loss, triumph, etc.
accuracy:       number           // 0-100, how accurately this is remembered
timesRecalled:  number           // How often has this been remembered
lastRecalled:   WorldTime        // When was this last accessed
narrative:      string           // The character's subjective version of events
}

```

### Memory Formation Rules:

Not every event becomes a memory. An event creates a memory when it directly involves the character (as actor, target, or witness) and exceeds a significance threshold modified by the character’s personality. A highly empathetic character forms memories from witnessing others’ suffering. A self-absorbed character only remembers events that directly affected them. An ambitious character particularly remembers power dynamics — who helped them, who blocked them, who failed to support them when it mattered.

### Memory Decay and Distortion.

Memories decay over time — their significance score slowly decreases, and eventually low-significance memories are pruned. However, highly emotional memories resist decay. A traumatic betrayal (emotional weight: -90) stays vivid for a lifetime. A pleasant dinner party (emotional weight: +20) fades within a few years.

More importantly, memories distort. Each time a memory is recalled (which happens when the character encounters a related situation or person), its accuracy score has a chance to decrease. Details shift, emotions intensify, blame is redistributed. A character who was partly responsible for a failed battle might, after years of replaying the memory, remember the failure as entirely their rival’s fault. This memory distortion is the engine that powers grudges, heroic self-narratives, and the divergence between what “actually happened” (the event log) and what a character “remembers” (their memory store).

## 6.2 Reputation System

Reputation is the social mirror of memory — it is what other people believe about a character, as opposed to what the character believes about themselves.

### Reputation Propagation Model:

When a character performs a witnessed action, the witnesses form memories of that action. These witnesses then share their perception through their social networks — gossip, letters, official reports, bardic songs. Each retelling has a chance to distort the story (like a game of telephone), and each receiver applies their own biases to what they hear.

Propagation chain:

1. Character performs action (Event generated)
2. Witnesses form memories (with their own bias)
3. Witnesses share with contacts (distortion chance per hop)
4. Recipients share with their contacts (further distortion)
5. After N hops, the story may be significantly different from reality

Propagation speed depends on:

- Social network density (court gossip spreads fast, rural news slow)
- Story significance (dramatic events spread further)
- Existing reputation (stories about famous people spread faster)
- Trade routes and communication infrastructure

### Reputation Components:

A character's reputation is not a single number — it is a multi-dimensional profile that varies by audience:

- *Martial Reputation*: How formidable are they in combat? (based on witnessed battles, reported duels, military victories)
- *Diplomatic Reputation*: How trustworthy and skilled in negotiation? (based on kept/broken agreements, successful treaties)
- *Scholarly Reputation*: How knowledgeable and wise? (based on published works, known discoveries, teaching)
- *Moral Reputation*: How virtuous or villainous? (based on perceived actions, heavily colored by the observer's moral framework)
- *Magical Reputation*: How powerful a practitioner? (based on known spells, magical feats, artifacts created)
- *Leadership Reputation*: How effective a leader? (based on faction performance, follower loyalty, crisis management)

Each dimension exists as a separate value for every faction and social group that has heard of the character. Mordain the Shadowweaver might have high Scholarly and Magical reputation everywhere, but his Moral reputation is “terrifying villain” in most kingdoms and “misunderstood genius” among his apprentices.

## 6.3 Generational Grudges and Inheritance

When a character dies, their memories do not simply vanish. The character's family members — children, spouses, close allies — inherit a filtered version of the deceased's most emotionally significant memories. A father who was betrayed by House Valmont tells his children about the betrayal. The children inherit the grudge, though at reduced intensity (perhaps 60% of the parent's emotional weight). The grandchildren inherit it at further reduced intensity (30%), but it can be refreshed if House Valmont performs any new hostile action.

### Grudge Mechanics:

Inherited grudge intensity:

Generation 1 (direct experience): 100% emotional weight  
Generation 2 (parent's story): 60% emotional weight  
Generation 3 (grandparent): 30% emotional weight  
Generation 4 (great-grandparent): 10% emotional weight  
Generation 5+: Fades to cultural memory (not personal grudge)

**Grudge refreshing:**

If the target family/faction performs a hostile action against any member of the grudge-holding family, the grudge resets to the intensity appropriate to the new event, or the inherited intensity, whichever is higher.

**Grudge resolution:**

- Apology/reparation from the target can reduce grudge intensity
- Inter-marriage between families can reduce grudge intensity
- A major shared threat can suppress (but not eliminate) grudges
- Enough time without contact eventually lets grudges fade
- A character with the "forgiving" personality trait decays grudges faster
- A character with the "vengeful" trait decays grudges slower and actively seeks opportunities to act on them

**Cultural Memory.** When a grudge fades below individual significance but was historically important, it transitions to cultural memory. The Valmont-Stormhold feud might no longer be a personal grudge for any living individual, but it persists as a cultural narrative — “House Valmont and House Stormhold have been enemies for generations.” This cultural memory has lower intensity but much longer duration, and it creates a background bias in how members of each house perceive the other.

## 6.4 False Memories and Propaganda

Not all information in the simulation is true. The system explicitly models information distortion:

**Organic Distortion.** Memories naturally degrade and shift over time (as described above). A character who remembers a battle they fought 40 years ago may recall themselves as more heroic than they actually were, or may blame an ally for a failure that was actually shared.

**Deliberate Propaganda.** Faction leaders, religious authorities, and powerful individuals can deliberately create false narratives. A king who seized power through a coup has his historians write accounts showing the previous king was a tyrant. A religious order might rewrite the history of a saint to align with their current doctrine. An ambitious noble might spread false rumors about a rival.

**In-World Historians.** When the simulation generates a book-writing event for a historian character, the historian’s account is filtered through their biases.

A historian employed by Kingdom A portrays Kingdom A favorably. A historian with a scholarly bent focuses on intellectual achievements and minimizes military history. This produces contradictory historical accounts within the simulation, which the Unreliable Chronicler system (Section 10) surfaces to the player.

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## 7. Event Interconnection Engine

The event cascade system is what separates this simulator from a random event generator. Every event can cause other events, and those events can cause further events, creating chains that span centuries and connect seemingly unrelated domains.

### 7.1 The Cascade Model

When an event is resolved, the Event Interconnection Engine evaluates its **consequence potential** — a set of possible follow-on events, each with a probability weight. The probability is not a static value — it is dynamically calculated based on the current world state.

#### Example: A Mage Completes a Groundbreaking Grimoire

The event “Wizard Thessalon writes The Emerald Codex, a revolutionary enchantment treatise” triggers a consequence evaluation:

1. **Knowledge spreads to neighboring kingdoms** (probability: 80%, modified by trade route connectivity). If the kingdoms have trade routes and literate populations, the book spreads. If they are isolated or illiterate, it does not.
2. **Existing magical institutions react** (probability: 90%). Academies might celebrate the advance, religious orders might condemn it, rival wizards might try to discredit or steal the work.
3. **New practitioners emerge** (probability: proportional to Magic Prevalence). If magic is already common, more people take up the new enchantment school. If magic is rare, fewer respond.
4. **Political implications** (probability: depends on current political dynamics). If a kingdom is looking for military advantage, they might recruit the new enchantment specialists as weapons of war.

Each triggered consequence is itself an event with its own consequence potential, creating the chain the design document describes: book → knowledge spreads → academy founded → graduates gain influence → political shift → war → resistance → counter-movement.

### 7.2 Cascade Depth and Dampening

Not every cascade runs forever. The system uses a **dampening function** where each subsequent consequence in a chain has slightly reduced probability



of triggering further consequences. This prevents infinite cascade loops while still allowing deep chains. The dampening is reduced for high-significance events (a world-shaking catastrophe cascades further than a minor trade dispute).

### 7.3 Cross-Domain Cascading

The most interesting cascades cross domain boundaries. A military event triggers political consequences triggers economic effects triggers cultural responses. The cascade engine explicitly models these cross-domain transitions:

Military victory → Political: Territory changes, war reparations  
→ Economic: Trade route shifts, resource acquisition  
→ Cultural: Victory literature, heroic narratives  
→ Religious: "God favored us" interpretation  
→ Personal: Veterans with trauma and glory  
→ Magical: Captured enemy spellbooks, war-magic innovation

Religious schism → Political: Factions align with different sects  
→ Economic: Trade disruption along sectarian lines  
→ Military: Holy war potential  
→ Cultural: Artistic movements reflecting spiritual crisis  
→ Personal: Families split by faith  
→ Scholarly: Theological debates produce new philosophy

### 7.4 The Narrative Significance Amplifier

Some cascades develop a self-reinforcing quality where each link in the chain is slightly more significant than the last. The engine detects these “rising action” patterns and marks them as **narrative arcs** — tracked chains that the narrative engine treats with special attention. When a chain reaches its climax (the highest-significance event in the sequence), the narrative engine produces its most dramatic prose.

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## 8. The Narrative Engine

The Narrative Engine transforms raw simulation events into readable, atmospheric prose. It operates on a template-based system augmented with contextual variation, literary device insertion, and tone control.

### 8.1 Template Architecture

Each event type has multiple associated templates organized by significance level and tone. Templates are parameterized text blocks with entity references, conditional sections, and tone modifiers.

#### Template Components:

- **Entity References:** {character.name}, {character.title}, {character.epithet}, {faction.name}, {site.name} — automatically resolved from entity state at event time.
- **Pronoun Handling:** {pronoun.subject}, {pronoun.object}, {pronoun.possessive} — correctly gendered based on character data.
- **Conditional Sections:** {#if condition}...{/if} — include or exclude text based on world state. “The succession was contested” only appears if there is actually a rival claimant.
- **Tone Modifiers:** Templates exist in multiple tone variants (epic, personal, mythological, political, scholarly).
- **Significance Scaling:** Low-significance events get brief, dry templates. High-significance events get dramatic, literary templates with metaphor and foreshadowing.

## 8.2 Tone System

The player selects a narrative tone that governs which template variants are used and how prose is styled:

**Epic Historical.** Grand, sweeping language. Focuses on civilizations and eras. Uses phrases like “the realm mourned,” “destiny would decree,” “an age of darkness descended.” Characters are described by their roles and epithets more than their personal feelings. This is the “narrator reading from a history book” voice.

**Personal Character Focus.** Intimate, character-driven language. Focuses on individual experiences and emotions. Uses phrases like “she felt the weight of the crown,” “he could not forgive what had been done,” “the letter trembled in his hands.” Events are filtered through the perspectives of the people who lived them.

**Mythological.** Ancient, reverent language. Focuses on cosmic significance and symbolic meaning. Uses phrases like “in the Time Before Time,” “forged in celestial fire,” “prophecy speaks of a reckoning.” This tone treats events as legend, amplifying their grandeur and stripping away mundane detail.

**Political Intrigue.** Analytical, suspicious language. Focuses on power dynamics and hidden motivations. Uses phrases like “observers noted the conspicuous absence,” “intelligence suggests deeper currents,” “the real negotiations happened behind closed doors.” This tone treats every event as a chess move.

**Scholarly.** Dry, academic language. Focuses on causes, effects, and analysis. Uses phrases like “evidence suggests,” “the primary factor was,” “contrary to popular belief.” This tone treats events as subjects of study rather than drama.

### 8.3 Literary Device Integration

The narrative engine is not limited to filling in template blanks — it also inserts literary devices that create the texture of real storytelling:

**Foreshadowing.** When the engine detects a “rising action” narrative arc (see Section 7.4), it inserts subtle hints in earlier events’ narratives. When describing the founding of a magic academy, the engine might add “none could foresee the horrors this pursuit of knowledge would eventually unleash” if it knows the cascade leads to a magical catastrophe.

**Dramatic Irony.** When the player knows something a character does not (because the player can see the full event log), the narrative engine can highlight the gap. A king confident in his general’s loyalty might be described as “placing his trust in the very man who would betray him three years hence.”

**Metaphor Selection.** Templates include metaphor slots that are filled from a context-appropriate pool. A death in winter draws from cold/sleep metaphors. A political rise draws from climbing/height metaphors. A naval battle draws from storm/tide metaphors.

**Callback and Echo.** When a current event mirrors a historical one, the narrative engine references the parallel. “Like the first Valmont who defied a king, so too did his great-granddaughter stand before the throne and refuse to kneel.”

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## 9. Micro-Narrative Vignettes

Beyond the chronicle-style narrative log, the simulator occasionally produces small, intimate scene fragments — moments of fiction that bring the simulation’s characters to life in a way that summary prose cannot.

### 9.1 Design Philosophy

Vignettes are rare by design. If they appeared constantly, they would lose their emotional impact and slow the simulation to a crawl. The target frequency is approximately one vignette per 50-100 simulation years, with the exact rate tunable by the player. Their rarity makes each one feel like a discovered treasure — a moment where the curtain between simulation and story lifts.

### 9.2 Trigger Conditions

A vignette is generated when an event meets all of the following criteria: - Significance score above 85 - At least one participant character has a rich memory history (10+ significant memories) - The event involves strong emotional content (betrayal, triumph, sacrifice, reunion, discovery) - No vignette has been generated in the last 50 simulation years (cooldown)

Additionally, certain event archetypes have elevated vignette probability: - A general's reflection before a battle that will determine the fate of a civilization - The moment of discovery for a scholar finding something world-changing - A reunion or confrontation between characters with deep shared history - A child hearing a story about a character the player watched grow up in the simulation - A character's death when they have been a major figure for generations - A betrayal of deep trust between characters with high relationship scores

### 9.3 Vignette Structure

Each vignette is a short prose fragment (200-500 words) written in present tense, close third-person perspective. It does not explain context — it drops the reader into a moment and trusts that the simulation has provided enough context through the event log and inspector.

#### Example Vignette — The General Before Battle:

A MOMENT IN TIME - Year 1247, Day of the Red Dawn

The tent flap does not move. The wind has died, as if the world itself holds its breath before what is to come.

General Kaelin Stormhold stands over the map table, but her eyes are not reading the terrain lines or the painted markers representing ten thousand soldiers. She is looking at the small iron ring on her left hand - the one her mother wore, the one her mother's mother wore before the Valmont treachery took their ancestral seat three generations past.

Tomorrow she will face the Valmont host across the Ashenmere. They will have the high ground. They will have the sun at their backs. They will have numbers.

She has something else.

She touches the ring, and somewhere in the archives of memory - her mother's voice, her grandmother's fury, a hundred years of waiting - she finds the thing she needs.

Not courage. Not strategy. Not divine favor.

Certainty.

She calls for her captains.

This vignette connects to the Memory & Reputation system (inherited grudge), the Military system (upcoming battle), and the Character AI (personality-driven certainty). It draws its power from context the simulation has been building for generations.

#### 9.4 Vignette Categories

The system has templates for the following vignette types:

- **Before the Storm:** A leader contemplating a decision that will change everything. Tone: tense, reflective.
  - **The Discovery:** A scholar/explorer encountering something beyond understanding. Tone: awe, wonder.
  - **The Confrontation:** Two characters with deep history facing each other. Tone: loaded silence, old wounds.
  - **The Legacy:** A child or student hearing about events the player witnessed. Tone: nostalgia, mythologizing.
  - **The Farewell:** A character at the end of their life. Tone: peaceful or bitter, depending on life events.
  - **The Betrayal:** The moment trust breaks. Tone: sharp, visceral.
  - **The Coronation/Ascension:** A character taking on a role that will define them. Tone: weight, expectation.
  - **The Aftermath:** A character surveying the consequences of a major event. Tone: shell-shock, revelation.
- 

## 10. The Unreliable Chronicler

### 10.1 Concept

The simulation does not have an objective narrator — or rather, the objective view (the raw event log) exists alongside subjective interpretations. The Unreliable Chronicler system introduces in-world narrator characters whose biases, allegiances, and personalities color how they report events. The player can switch between chroniclers to see events from different perspectives, discovering that history is not fixed truth but contested narrative.

### 10.2 Chronicler Generation

Chroniclers are special character entities with the following additional components:

- **Faction Allegiance:** The chronicler is employed by, born into, or sympathetic toward a specific faction. Events involving this faction are presented more favorably.
- **Ideological Bias:** The chronicler has intellectual preferences. A militarist chronicler emphasizes warfare and heroism. A religious chronicler interprets events through theological frames. A humanist chronicler focuses on individual stories and moral lessons.
- **Knowledge Limitation:** A chronicler in Kingdom A may not have accurate information about events in distant Kingdom B. Their account of foreign events is based on whatever information reached them — which may be incomplete, delayed, or distorted.
- **Personal Grudges and Admiration:** A chronicler who was personally wronged by a character portrays that character unfavorably. A chronicler who admires a particular leader writes hagiography.
- **Writing Style:** Each chronicler has a distinct prose style. One might be flowery and metaphor-heavy, another might be terse and factual, a third might be sardonic and critical.

### 10.3 How It Works

When the narrative engine generates prose for an event, it generates a “base narrative” from the template system and then passes it through the active chronicler’s bias filter. The filter modifies the narrative in the following ways:

**Faction Spin.** Events are reframed to favor the chronicler’s faction. A battle loss becomes “a strategic withdrawal.” A war of aggression becomes “a just campaign to protect our borders.” A rival faction’s cultural achievement is downplayed or attributed to earlier work by the chronicler’s faction.

**Omission.** A chronicler might simply not report events that embarrass their faction or that they have no knowledge of. The player notices gaps in one chronicler’s account that are present in another’s.

**Attribution Shift.** Credit for achievements shifts toward the chronicler’s favored individuals. Blame for failures shifts toward outsiders, rivals, or scapegoats.

**Tone Adjustment.** The same event described by two chroniclers might differ dramatically in tone. One describes a siege as “the valiant defense of our sacred capital.” The other describes it as “the desperate stand of a tyrant clinging to stolen power.”

### 10.4 Player Interaction

The player can: - **Switch Chroniclers.** A UI dropdown lets the player select from available chroniclers. The narrative panel updates to reflect the selected chronicler’s perspective. - **Compare Accounts.** A split view shows the same event as told by two different chroniclers side by side, highlighting where their

accounts diverge. - **View the Raw Record.** The “objective” view (the raw event log) is always available as a ground truth against which biased accounts can be compared. - **Commission New Chroniclers.** Using influence points, the player can inspire a character to become a chronicler, effectively creating a new narrative perspective.

### 10.5 The “Lost History” Mechanic

If all chroniclers who recorded a particular event die without passing their works to a library or successor, the detailed narrative of that event is “lost.” It still exists in the raw event log, but the narrative panel shows only a bare summary with a notation: “Detailed accounts of this event have been lost to time.” This creates a sense that history is fragile — knowledge can be destroyed by war, fire, or simple neglect.

If a later archaeologist or historian character rediscovers lost texts, the narratives are restored, potentially with new biases from the rediscoverer’s interpretation. The player might watch a civilization’s history being literally rewritten as scholars debate the meaning of rediscovered texts.

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## 11. User Interface Design

### 11.1 Visual Philosophy

The interface uses a **high-fidelity ASCII aesthetic** — richly colored extended ASCII and Unicode characters creating a dense, information-rich visual field. This is not “retro” styling for nostalgia — it is a deliberate design choice that emphasizes information density over graphical fidelity. A 200-character-wide terminal can display more simultaneous data points than a graphical interface of equal size, and the abstract nature of ASCII characters encourages the player to use imagination to fill in visual detail (which the narrative engine supports with prose).

The color palette is vibrant and saturated, using terminal colors to differentiate terrain types, faction territories, entity types, and significance levels. Animations are subtle — color cycling for active events, character alternation for moving entities, pulsing for the player’s current focus.

### 11.2 Main Interface Screens

**World Map View.** The primary navigation screen showing terrain rendered with biome-specific characters and colors. Mountains ( in gray/brown), forests ( in dark green), plains ( in light green), oceans ( in blue), deserts ( · in tan), tundra ( · in white), swamps (~ in olive), volcanoes ( in red). Cities are marked with in the faction’s color, ruins with †, armies with , temples with , academies with . The map supports multiple zoom levels (from world overview

to individual-structure detail) and toggleable overlays (political borders, trade routes, resource distribution, military movements, climate patterns, magical phenomena).

**Event Log View.** Split panel showing raw event log on the left and narrative interpretation on the right. The raw log is chronological and factual: “Year 1247, Day 23: King Aldric III of Valoria died of old age.” The narrative panel presents the same event in prose, styled according to the active tone and filtered through the active chronicler. Features include auto-scrolling with pause, filtering by category/location/entity, keyword search, event bookmarking, cause-effect chain visualization, and historical scrubbing.

**Entity Inspector.** Deep-dive panel for any selected entity, rendered in box-drawing characters. Character inspectors show full biography with ASCII bar charts for attributes ( 80/100), personality trait listings, relationship networks with sentiment indicators ( for love, for rivalry, for conflict), possession inventories, spell lists, event timelines, goal displays, and narrative biographies. Location inspectors show geography, demographics, economy, governance, history. Faction inspectors show territory, leadership, military, diplomacy, culture.

**Relationship Graph View.** Node-and-edge ASCII graph with color-coded relationship types. Family (blue), friendship (green), rivalry (red), political alliance (yellow), religious affiliation (purple), teacher-student (cyan). Edge intensity indicates relationship strength. The graph supports filtering by type, temporal scrubbing to see how relationships evolved, cluster detection for factions and social groups, and centering on a selected entity with configurable depth (1-3 hops).

**Timeline View.** Horizontal timeline with key events marked by significance. Era divisions with cultural characteristics labeled. Parallel tracks for different civilizations (color-coded rows). Zoom from millennia overview to daily granularity. Event filtering and search. Branching visualization for timeline branches (see Section 14).

**Statistics Dashboard.** Aggregate data visualization using ASCII bar charts, line charts, and area charts. Population by race and civilization over time. Territory control stacked area chart. Technology progress indicators per civilization. Magic prevalence charts. Warfare intensity heatmaps. Economic production trends. Religion follower distributions.

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## 12. Player Interaction & Influence

### 12.1 The Cultivation Model

The player’s role is that of an invisible cosmic gardener. They cannot command armies, write laws, or force characters to act. Instead, they expend **Influence Points** (IP) to nudge the world in subtle directions. The system is designed



so that the player's interventions always feel plausible — as if they might have happened naturally anyway.

## 12.2 Influence Point Economy

Influence Points regenerate slowly over time (base rate: 1 IP per simulation year, modified by world age — older worlds have accumulated more “narrative momentum” that resists change). Major interventions cost more IP than subtle ones, and the total pool is capped so the player cannot stockpile unlimited influence.

## 12.3 Influence Categories

**Divine Intervention (5-50 IP):** - Inspire a character with an idea (5 IP). Plants a thought seed that may or may not take root based on the character's personality and circumstances. - Send a prophetic dream to a religious figure (10 IP). The character may interpret the dream literally, metaphorically, or ignore it. - Arrange a “coincidental” meeting between two important characters (15 IP). They still have to decide what to do with the encounter. - Subtle personality nudge in a key individual (20 IP). Shifts one personality trait slightly in one direction. Can be resisted by strong-willed characters. - Reveal hidden information to someone (25 IP). The character learns a secret but must decide how to act on it. - Small luck modifier to a specific action (10 IP). Increases success probability of one attempt. Does not guarantee success. - Grant a vision of a possible future (30 IP). A character glimpses a potential outcome, which may motivate or terrify them. - Empower a champion (50 IP). Temporarily boosts a character's abilities for a single event. The most expensive and direct intervention.

**Environmental Influence (5-30 IP):** - Adjust weather patterns (5 IP). A timely storm or drought can shift agricultural output, military campaigns, or moods. - Minor geological changes (15 IP). A new spring appears, a river shifts course, a fertile patch emerges. Must be plausible. - Animal migration pattern shift (5 IP). Herd animals move toward or away from a settlement, affecting food supply. - Resource discovery likelihood increase (20 IP). Does not place resources — just increases the chance that an exploring character finds something. - Trigger a natural event (30 IP). An earthquake, eruption, or flood. Must be geologically plausible for the region.

**Cultural Influence (5-20 IP):** - Promote a specific art form or philosophy (10 IP). Slightly increases the resonance of a particular cultural movement. - Encourage a technological research direction (15 IP). A researcher is slightly more likely to pursue a specific line of inquiry. - Strengthen or weaken a tradition (10 IP). A cultural practice becomes slightly more or less popular. - Introduce a foreign concept (20 IP). A character has an idea from outside their cultural context, as if by “inspiration.”

## 12.4 Resistance and Believability

Not all influence succeeds. The system applies two checks:

**Resistance Check.** Some entities resist influence based on willpower (personality trait), magical protection, or divine favor. A character protected by a god is harder to influence. A character with strong convictions resists personality nudges.

**Believability Check.** Every intervention is evaluated for plausibility. If the influence would produce an outcome that is wildly inconsistent with the current context — inspiring a pacifist monk to declare war, for example — the intervention fails and the IP is partially refunded. The system enforces that player influence always looks like a natural extension of existing dynamics, not a *deus ex machina*.

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## 13. World DNA / Fingerprint System

### 13.1 Concept

Each generated world develops a unique identity over time. The World DNA system captures this identity in a compact, visual “fingerprint” that lets the player quickly understand the character of a world and compare different worlds.

### 13.2 Fingerprint Components

The fingerprint is a composite visualization containing several sub-glyphs:

**Balance Glyph.** A small radial diagram showing the relative weight of six domains in the world’s history: Warfare, Magic, Religion, Commerce, Scholarship, and Diplomacy. A war-dominated world produces a glyph heavily weighted toward the Warfare axis. A world where magic drove most of the important events weights toward Magic. The shape of this glyph immediately communicates the world’s “flavor.”

**Civilization Palette.** A horizontal color bar showing the dominant civilizations, ordered by historical significance. Each civilization’s assigned color fills a proportional segment of the bar. A world dominated by one empire has a bar mostly one color. A world with many competing powers is a rainbow.

**Volatility Graph.** A small sparkline showing conflict intensity over the world’s history. Peaks represent eras of war; valleys represent peace. The shape communicates whether the world was consistently turbulent, consistently peaceful, or oscillated between eras.

**Magic Curve.** A small sparkline showing how magical prevalence changed over time. Some worlds see magic increase as research accumulates. Others see

magic decline as religions suppress it. The shape tells the story of the world's relationship with the arcane.

**Population Trend.** A small sparkline showing total sentient population over time. Growth indicates stability and prosperity; decline indicates war, plague, or catastrophe. Sudden drops mark existential crises.

**Complexity Score.** A single number (0-100) representing the total number of significant event cascades, cross-domain interactions, and narrative arcs that the world produced. High complexity means rich, interconnected stories. Low complexity means simpler, more linear histories.

### 13.3 Use Cases

- **World Selection.** When the player has generated multiple worlds, the fingerprint gallery lets them quickly find worlds with interesting characteristics. “Show me worlds where magic declined” or “find worlds with high conflict” becomes a visual scan.
  - **World Comparison.** Place two fingerprints side by side to see how different parameter choices produced different histories from the same seed.
  - **Personal Collection.** Players can name, tag, and organize their favorite world fingerprints as a collection — a gallery of pocket universes.
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## 14. “What If” Timeline Branching

### 14.1 Concept

At any point during the simulation, the player can create a **timeline branch** — a snapshot of the world state that forks into an alternate history. The player makes one change to the branching point (or simply lets it run without change) and watches how the different outcome cascades through subsequent centuries. This transforms the simulator from a single-history viewer into a tool for exploring counterfactual narrative.

### 14.2 Branching Mechanics

**Creating a Branch.** The player pauses the simulation at a moment of interest, selects “Create Branch” from the menu, and specifies the divergence point. The divergence can be: - Reversing an event outcome (“What if the battle went the other way?”) - Removing a character (“What if the hero died before the war?”) - Changing a character’s decision (“What if the king chose peace instead of war?”) - Adding an event (“What if a volcanic eruption happened here?”) - Doing nothing (just running the same world state forward with different random seeds to see natural variance)

**Running Branches.** Each branch runs as an independent simulation from the divergence point forward. The player can switch between branches, watching

each one advance independently or in parallel.

**Comparison View.** A special split-screen view shows both timelines side by side, synchronized to the same simulation date. Differences are highlighted — territories that diverged, characters who lived in one timeline but died in the other, events that occurred in one but not the other. A “divergence tracker” shows how many entities have significantly different states between the two timelines, giving a quantitative measure of how much the single change affected.

### 14.3 Cascade Visualization

The most compelling use of branching is watching a single change ripple outward. The comparison view includes a “cascade map” showing which events in each timeline share common causes and where the causal chains diverged. This allows the player to trace exactly how “the general surviving the battle” led, through a chain of 47 linked events, to “an entirely different civilization dominating the continent 200 years later.”

### 14.4 Branch Limits

For performance reasons, the player is limited to a configurable number of active branches (default: 3). Old branches can be archived (saving their state but not actively simulating) or deleted. The comparison view only compares two branches at a time.

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## 15. Procedural Heraldry & Symbolism

### 15.1 Concept

Every faction in the simulation receives a procedurally generated coat of arms rendered in ASCII art using box-drawing characters. The heraldry is not purely decorative — it is derived from the faction’s culture, values, and history, creating a visual language that communicates identity at a glance.

### 15.2 Heraldry Generation

Each coat of arms is composed of:

**Shield Shape.** Selected from a library of ASCII shield templates appropriate to the faction’s culture. A knightly kingdom gets a classic shield. A maritime republic gets a round seal. A tribal confederation gets a totem-style vertical arrangement.

**Field Division.** The shield is divided into sections using standard heraldic patterns (per pale, per fess, quarterly, per bend, per chevron) rendered in ASCII box-drawing characters. The number of divisions reflects faction complexity —

simple tribal groups have undivided fields, sophisticated kingdoms have multiple divisions.

**Charges (Symbols).** ASCII art symbols placed on the field, drawn from the faction's cultural identity: - Animal symbols derived from the faction's dominant fauna or cultural totems - Weapon symbols for militaristic factions - Star/celestial symbols for religions and magic-focused cultures - Tool/craft symbols for trade-focused factions - Natural feature symbols (mountains, waves, trees) for geographically defined cultures

**Colors.** Derived from the faction's primary terrain (mountain factions favor gray/silver, forest factions favor green, desert factions favor gold/tan) modified by cultural values (aggressive factions add red, scholarly factions add blue, religious factions add purple).

### 15.3 Heraldic Evolution

Coats of arms are not static — they evolve with the faction: - A revolution replaces the old coat of arms with new symbolism reflecting the new ideology - A dynasty change modifies the arms to reflect the new ruling house - A territory expansion might add new elements from conquered peoples - A religious conversion might replace secular symbols with sacred ones - A political union of two factions might combine their arms (quartering)

Each version of a faction's coat of arms is archived, creating a visual history of the faction's political evolution viewable in the Timeline.

### 15.4 Display and Use

Coats of arms appear in faction inspector panels (large, detailed rendering), on the world map as territory markers (small, abbreviated rendering), in battle event narratives ("under the banner of the crimson eagle"), and in diplomatic event descriptions. The player can view a gallery of all factions' current and historical arms.

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## 16. Export & Documentation System

### 16.1 Exportable Content Types

**World Encyclopedia.** A comprehensive compendium of all entities, events, and lore, organized by category. Includes entries for every named character, settlement, faction, artifact, book, spell, religion, and event in the world's history. Each entry cross-references related entries.

**Character Chronicles.** Individual biographies for selected characters, written in the active narrative tone and filtered through the active chronicler. These

read as self-contained short stories — the complete life of a character from birth to death.

**Historical Timelines.** Chronological narratives of the world’s development, with configurable scope (a single civilization, a single century, a single war, or the entire history).

**Genealogies.** Family trees rendered in ASCII art with connecting lines, showing trait inheritance, marriage alliances, and hereditary grudges.

**Map Atlases.** Rendered world maps at multiple time points showing territorial changes. A “time-lapse atlas” shows the rise and fall of empires as a sequence of snapshots.

**Religious Texts.** In-world holy books with doctrines, creation myths, prophecies, and moral codes — generated from the actual events of the simulation and filtered through the biases of the religion’s theologians.

**Grimoires.** Collections of spells organized by school, creator, and era — a magical textbook from within the simulation world.

**Cultural Guides.** Descriptions of art styles, musical traditions, literary movements, fashion, cuisine, and social customs for each civilization.

## 16.2 Export Formats

- Plain text files (preserving ASCII art formatting)
  - HTML documents with CSS styling matching the terminal aesthetic
  - JSON/XML data for external analysis and tool integration
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# 17. Performance Architecture

## 17.1 Core Optimizations

**Spatial Partitioning.** A quadtree data structure indexes all geographically-located entities, enabling efficient nearest-neighbor queries, range queries, and “what is near this location” lookups. The quadtree is rebuilt incrementally each tick for moved entities.

**Event Queue Prioritization.** The event queue is a priority queue (binary heap) ordered by significance, ensuring that the most important events are processed first and that processing time is spent on events that matter.

**Historical Data Compression.** Older events are progressively compressed — recent events keep full detail, events from decades ago keep moderate detail, events from centuries ago keep only significance, category, and participant summaries. This prevents the event log from growing unboundedly.

**Object Pooling.** Frequently created and destroyed objects (events, temporary calculations, query results) are drawn from pools rather than allocated/deallocated, reducing garbage collection pressure.

**Lazy Evaluation.** Entity state that is not currently being queried or simulated is stored in compact form and only expanded when needed. A character in the Background LoD zone does not have their full decision tree evaluated — they only have it evaluated when they are involved in a significant event or when the player inspects them.

## 17.2 Memory Budget Targets

- Small (200×200) world: < 500MB RAM, simulation speed target: 10,000× real-time
- Medium (400×400) world: < 1.5GB RAM, simulation speed target: 5,000× real-time
- Large (800×800) world: < 4GB RAM, simulation speed target: 1,000× real-time
- Epic (1600×1600) world: < 8GB RAM, simulation speed target: 200× real-time

These are targets for fast-forward simulation speed. Normal play speed (1 day/second) should be effortless on all world sizes.

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## 18. Extended Design Concepts

### 18.1 The Dreaming Layer

Beyond conscious decisions, characters have a subconscious **Dreaming Layer** that processes their experiences during “sleep.” Each night (each tick), characters with high emotional memory loads have a chance to “dream.” Dreams are not displayed in the event log by default, but they influence the character’s next day’s decision-making.

Dreams can resolve conflicting goals (a character torn between loyalty and ambition might dream a scenario where both are satisfied, reducing internal stress), reinforce fears (a character with traumatic memories might dream of the trauma, increasing anxiety-related behavior), or generate creative inspiration (a scholarly character might dream of a novel connection between ideas, which translates to a research breakthrough).

The player can spend influence points to send a specific dream to a character — this is the “prophetic dream” intervention, but mechanically it works by inserting content into the Dreaming Layer that the character processes as if it were natural.

## 18.2 The Acoustic/Musical Layer (Web Frontend)

For a future web-based frontend, the simulation can generate procedural ambient soundscapes reflecting the current world state. Peaceful eras produce gentle, consonant tones with slow tempos. Wartime shifts to dissonant, percussive patterns with faster tempos. Magical events trigger ethereal, otherworldly sounds. Major events can have musical “stingers” — short melodic phrases that mark their occurrence.

The system would use Tone.js to generate these soundscapes in real-time, with the following mapping: - Base harmony: determined by the dominant faction’s cultural “mood” - Tempo: determined by simulation speed and event density - Instrumentation: determined by technology level (primitive drums for Stone Age, full orchestration for Renaissance) - Dissonance: proportional to conflict intensity - Magic motif: a recurring melodic fragment that appears whenever magical events occur, growing more prominent as magic prevalence increases

## 18.3 Character Introspection Mode

When the player selects a character and enters Introspection Mode, the narrative engine generates first-person internal monologue reflecting the character’s current mental state. The player reads the character’s thoughts, worries, ambitions, and memories as an inner stream-of-consciousness.

This mode uses the character’s personality traits, active goals, emotional memory weight, and current context to generate text that “sounds like” the character would think. An ambitious but patient character thinks in long-term strategic terms. An impulsive and passionate character thinks in vivid emotional images. A scholarly character thinks in analytical frameworks.

Introspection Mode is the deepest level of inspection available and is most effective with characters who have rich histories and complex inner lives.

## 18.4 The Oral Tradition System

Before writing is invented (or in illiterate cultures), knowledge and history are transmitted through oral tradition. Oral traditions are modeled as memes that propagate through social networks with high mutation rates. A heroic deed performed by a character named Bryn might, after 200 years of oral retelling, have transformed into the legend of “Bryngar the Invincible” who single-handedly defeated a dragon army — bearing only a distant resemblance to the actual event recorded in the event log.

When writing is later invented and scholars attempt to record oral traditions, they capture the distorted version. This means that the “historical record” within the simulation might contain fantastical accounts of mundane events, which the Unreliable Chronicler system faithfully reproduces.



The player can trace the evolution of an oral tradition from the original event to its final legendary form, watching each retelling add embellishments.

### **18.5 The Artifact Consciousness System**

Sufficiently powerful artifacts are not passive objects — they develop a rudimentary form of agency. An artifact forged during an event of extreme magical significance absorbs some of the emotional and magical energy of that moment, creating an “artifact personality” that subtly influences its wielder.

A sword forged in vengeance whispers (metaphorically) toward violence. A crown created during a golden age of prosperity inclines its wearer toward wisdom and generosity. A grimoire written by a paranoid wizard makes its reader slightly more suspicious.

The influence is subtle and operates through the Character AI system — a character possessing a strongly-willed artifact has their personality trait scores slightly modified in the direction of the artifact’s personality. The character might not even realize they are being influenced.

Artifacts can also “reject” wielders whose personality is fundamentally incompatible with the artifact’s nature. A holy sword might become unusable (or actively harmful) in the hands of a cruel tyrant.

### **18.6 The Ecological Pressure System**

The natural world is not merely a backdrop — it is an active participant in the simulation. Ecological pressure creates historical events:

- Overhunting depletes animal populations, reducing food supply and driving migration.
- Deforestation for building material reduces rainfall (simplified climate model), potentially turning farmland to scrubland.
- Mining operations can trigger geological instability.
- Magical pollution from intense magical activity creates “blighted zones” where flora and fauna mutate.
- Introduction of invasive species (through trade or exploration) can collapse local ecosystems.
- Dragon territories create dead zones that civilization cannot expand into without military action.

These ecological dynamics create constraints and opportunities that drive civilization in directions that pure politics and economics would not.

### **18.7 The Treaty System**

Beyond simple “alliance” or “war” states, factions can negotiate complex treaties with specific terms: - Mutual defense pacts (attack one, fight both) - Trade

exclusivity agreements (we trade only with each other for this resource) - Non-aggression pacts (we agree not to attack, but are not allies) - Tributary relationships (weaker faction pays stronger for protection) - Demilitarized zones (both sides withdraw troops from border region) - Cultural exchange programs (shared technology/knowledge development) - Marriage contracts (specific terms about succession and inheritance)

Treaties have terms that can be violated, and violations produce diplomatic crises. A faction that frequently violates treaties develops a “treacherous” diplomatic reputation that makes future negotiations harder.

### 18.8 The Secret Knowledge System

Some information in the simulation is hidden — not just from the player, but from most characters. Secret knowledge includes: the true identity of a disguised character, the location of a hidden artifact, a faction’s real military strength (as opposed to their perceived strength), a prophecy known only to a specific religious order, a discovered weakness of a powerful entity, and conspiracy plots not yet enacted.

Secret knowledge has a **revelation probability** that increases over time and with proximity to related events. A conspiracy is more likely to be discovered if the conspirators are careless, if a skilled spymaster is investigating, or if one conspirator is captured and interrogated.

When secret knowledge is revealed, it creates a high-significance event that cascades through multiple domains — political alliances shift, personal relationships rupture, military strategies change, and the narrative engine produces dramatic “the truth comes out” prose.

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*End of Game Design Document — Version 2.0*

*This document defines the design intent and system architecture for the Fantasy World Simulator. The companion Implementation Guide breaks these designs into concrete development tasks for Claude Code in VS Code.*