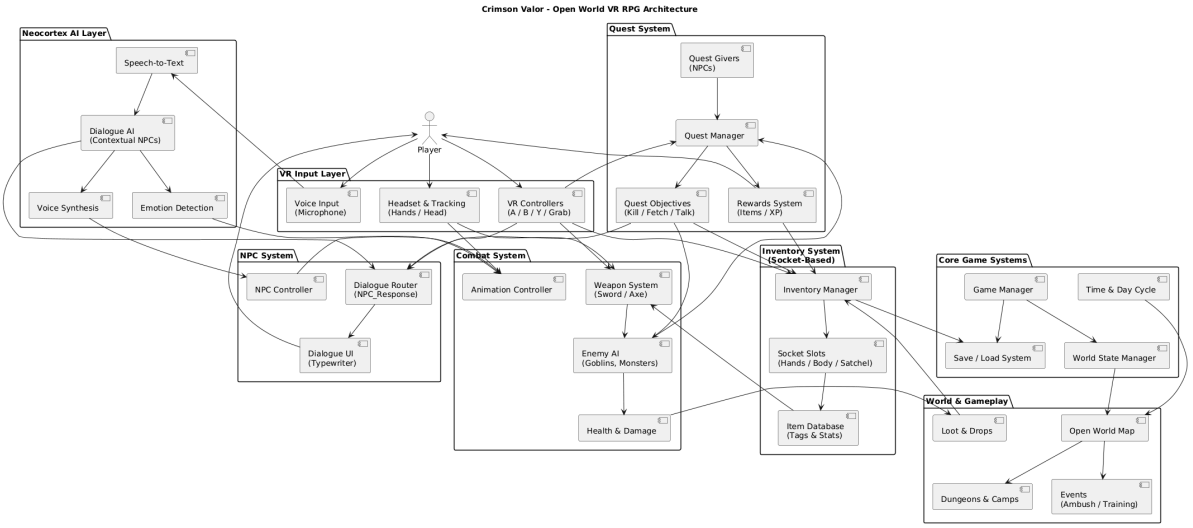
Final Report

Crimson Valor – System Overview

Crimson Valor is an **open-world VR RPG** where players explore a medieval fantasy world, interact with AI-driven NPCs, complete questlines, and engage in physical sword combat.
The game blends **traditional RPG systems** with **natural voice interaction** using Neocortex AI.

Game Architecture & Flow:



1. System Design

High-Level Design

The system follows a **modular, event-driven architecture**:

- VR input, AI dialogue, combat, quests, and inventory are **loosely coupled**
- AI responses and emotions propagate through Unity events
- World state persists through save/load mechanisms

Core Modules

- **VR Input Layer** – Controllers, hand tracking, voice input
- **Neocortex AI Layer** – Speech recognition, dialogue generation, emotion detection
- **NPC System** – Dialogue routing, animations, behavior logic
- **Quest System** – Objectives, rewards, progression
- **Inventory System** – Socket-based physical item storage
- **Combat System** – Weapon physics, enemy AI, health

- **World System** – Open world, events, dungeons

Key Design Principles

- Diegetic UI (in-world interactions instead of menus)
- Physicality first (hands, sockets, real objects)
- AI-driven narrative instead of rigid dialogue trees

2. Use Cases

2.1 Player–NPC Interaction

- Player speaks to NPC using voice
- Neocortex transcribes and interprets speech
- NPC responds with contextual dialogue and emotion
- Dialogue is displayed via typewriter UI and spoken aloud

2.2 Tutorial & Training

- NPC Lena teaches controls through sarcastic medieval dialogue
- Voice or button interaction triggers training sequences
- Fruit Ninja–style training helps players learn sword mechanics

2.3 Quest Progression

- NPCs assign quests through dialogue
- Objectives include:
    - Killing monsters
    - Collecting items
    - Talking to other NPCs
- Completion grants rewards (items, progression unlocks)

2.4 Combat & Loot

- Player fights monsters (e.g., goblins) using physical weapons
- Damage depends on weapon tags and hit detection
- Defeated enemies drop loot that feeds into inventory and quests

2.5 Inventory Management

- Items are grabbed and placed into socket slots
- Tags define item type, stats, and usability
- Inventory integrates with quests, combat, and equipment

3. External APIs & Tool Dependencies

Neocortex SDK

Used for:

- Speech-to-Text (voice transcription)
- AI dialogue generation
- Emotion detection
- Voice synthesis

Unity Engine

- Core game engine
- Physics, animation, NavMesh, UI
- XR Interaction Toolkit for VR

XR / OpenXR

- VR controller input
- Hand tracking
- Headset tracking

4. Impact

Player Experience

- Immersive NPCs that feel alive and reactive
- Natural communication without menu selection
- Strong presence and embodiment in VR

Game Design

- Reduces need for hard-coded dialogue trees
- Allows dynamic quest hints and reactions
- Makes tutorials feel like story moments

Technical Impact

- Encourages modular and scalable system design
- Demonstrates practical AI integration in VR
- Supports future expansion (new NPCs, quests, worlds)

5. Challenges & Limitations

Voice Recognition

- Background noise can affect transcription
- Player accents may reduce accuracy
- Requires fallback button interaction

AI Consistency

- AI responses must be constrained to medieval tone
- Needs prompt discipline to avoid immersion breaks

Performance

- VR + AI + physics is resource intensive
- Requires careful optimization for stable framerate

Debugging Complexity

- Event-driven systems can be harder to trace
- AI behavior is less predictable than scripted logic

Offline Dependency

- Neocortex requires network connectivity
- Limited functionality if AI services are unavailable

6. Learnings

Technical Learnings

- Event-based architecture scales better in complex games
- Separating AI logic from gameplay logic prevents coupling
- Socket-based inventory feels more natural in VR than menus

Design Learnings

- Short, character-driven dialogue improves immersion
- AI works best when tightly constrained by lore and rules
- Physical interaction reduces the need for UI explanations

AI Integration Learnings

- AI should enhance, not replace, core game mechanics
- Emotion signals are more useful than raw text alone
- Clear system boundaries prevent AI from breaking gameplay

Conclusion

Crimson Valor is not just a VR RPG — it's a **living world** where AI, physics, and narrative cooperate.
The strength of the system lies in how **voice, emotion, and action** flow together naturally.