LEXIQUE – ft_transcendence Technologies

MANDATORY BASELINE TECHNOLOGIES

• TypeScript – Frontend language providing strong typing and structure.

• SPA (Single Page Application) – App runs without full page reloads; browser Back/Forward must work.

• Mozilla Firefox (latest) – The website must work perfectly on the latest Firefox release.

• Docker – Entire system must run in a single container with a single command.

• HTTPS / WSS – All communications (including WebSockets) must be encrypted.

• Secure Password Hashing (bcrypt/argon2) – No plain-text passwords allowed.

• Input Validation (client or server) – Prevents SQL injections and XSS attacks.

OPTIONAL BASELINE (if backend chosen)

• PHP (No framework) – Raw backend logic without Symfony/Laravel/etc.

WEB MODULES

• Fastify (Node.js) – Backend framework replacing PHP (Major module).

• Tailwind CSS – Utility-first CSS styling for frontend (Minor module).

• SQLite – Lightweight database stored in a single file (Minor module).

• Avalanche + Solidity – Store tournament scores on blockchain (Major module).

USER MANAGEMENT MODULES

• OAuth2 – Login via Google/GitHub/etc. (Major module).

• Standard User Management – Users, avatars, stats, profiles (Major module).

GAMEPLAY / EXPERIENCE MODULES

• WebSockets (WSS) – Real-time gameplay synchronization & live chat (Major modules).

AI MODULES

• Custom AI (no A*) – AI must simulate input and see game state only once per second.

• Stats Dashboards – Data visualization (may use small chart libs).

CYBERSECURITY MODULES

• ModSecurity + WAF – Web firewall protection (Major module).

• HashiCorp Vault – Secure storage of secrets (Major module).

• GDPR Tools – Anonymization + account deletion (Minor module).

• JWT + 2FA – Token authentication + two-factor login (Major module).

DEVOPS MODULES

• ELK (Elasticsearch, Logstash, Kibana) – Log indexing & visualization (Major module).

• Prometheus + Grafana – System monitoring dashboards (Minor module).

• Microservices – Backend split into independent services (Major module).

GRAPHICS MODULE

• Babylon.js – Advanced 3D graphics rendering in browser (Major module).

ACCESSIBILITY MODULES

• Multi-language Support – i18n translation system.

• Visually Impaired Support – Screen reader & keyboard accessibility.

• SSR Rendering – Server-side HTML generation for performance.

SERVER-SIDE PONG MODULES

• Server-side physics + API – Game engine runs on backend (Major module).

• CLI Client vs Web Client – Terminal player can play against browser user (Major module).