PSScript Platform Implementation Summary

Date: January 26, 2026 **Based On**: TECH-REVIEW-2026.md **Status**: In Progress

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Executive Summary

This document tracks the implementation of improvements identified in TECH-REVIEW-2026.md. Many recommended upgrades have already been completed, significantly reducing the scope of remaining work.

✅ Already Completed (No Action Needed)

Dependency Upgrades

1. **React Query**: ✅ Already on v5.62.12 (Target: v5.x)
2. Frontend package.json shows `@tanstack/react-query: ^5.62.12`

3. Recommendation: Already complete!

4. **OpenAI SDK**: ✅ Already on v6.15.0 (Target: v4.x)

5. Backend package.json shows `openai: ^6.15.0`
6. Exceeds the recommended v4 upgrade

7. Recommendation: Already complete!

8. **LangGraph**: ✅ Already on v1.0.5 (Target: v1.0)

9. AI requirements.txt shows `langgraph==1.0.5`
10. langgraph-checkpoint==2.0.12 also installed

11. Recommendation: Already complete!

12. **Supporting Libraries**: ✅ Already Installed

13. Zod: v3.24.1 (for structured outputs)
14. cmdk: v1.0.4 (for command palette)
15. framer-motion: v11.15.0 (for animations)

🔴 Critical Priority (Week 1-2)

1. pgvector Upgrade to 0.8.0 with HNSW Indexes

Current State: - Backend: pgvector v0.1.4 - Python: pgvector v0.2.3

Target: pgvector v0.8.0

Performance Impact: - 9x faster vector search queries - 100x more relevant results - HNSW graph-based indexing

Implementation Steps: 1. Update backend/package.json: `pgvector: ^0.8.0` 2. Update src/ai/requirements.txt: `pgvector==0.8.0` 3. Create migration script (docs/migrations/pgvector-0.8.0-migration.sql) 4. Run migration on database 5. Test vector search performance

Research Sources: - AWS: Supercharging vector search with pgvector 0.8.0 - pgvector 2026 guide

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2. FastAPI Upgrade (0.98.0 → 0.115.x)

Current State: FastAPI v0.98.0

Security Risk: Medium (outdated dependencies)

Implementation Steps: 1. Update requirements.txt: `fastapi==0.115.0` 2. Update uvicorn to latest compatible version 3. Test all API endpoints 4. Check for breaking changes in middleware

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3. Agent System Consolidation

Current State Analysis:

Active Agents (Keep): - `agent_coordinator.py` - Main orchestrator ✅ - `multi_agent_system.py` - Multi-agent framework ✅ - `langgraph_production.py` - LangGraph 1.0 implementation ✅ -

`enhanced_memory.py` - Memory system ✅ - `tool_integration.py` - Tool registry ✅ - `task_planning.py` - Task planner ✅ - `state_visualization.py` - State tracker ✅ - `voice_agent.py` - Voice integration ✅

Legacy Agents (Archive): - `langchain_agent.py` - Superseded by LangGraph ❌ - `autogpt_agent.py` - No longer used ❌ - `hybrid_agent.py` - Redundant ❌ - `py_g_agent.py` - Experimental ❌ - `openai_assistant_agent.py` - Replaced by direct OpenAI integration ❌ - `agent_factory.py` - No longer needed after consolidation ❌

Implementation Steps: 1. Create `src/ai/agents/_archive/` directory 2. Move legacy agents to archive 3. Update imports in main.py to use langgraph_production.py 4. Remove agent_factory.py references 5. Test with LangGraph-only workflow

Expected Impact: - Remove ~3,500 LOC - 2.2x faster agent execution - 30-50% token cost reduction

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🟡 Medium Priority (Week 3-4)

4. Implement pgBouncer Connection Pooling

Current: Direct PostgreSQL connections

Target: pgBouncer for connection pooling

Implementation: - Add pgbouncer service to docker-compose.yml - Configure pool_mode=transaction - Update backend connection.ts to use pgbouncer port 6432 - Set max_client_conn=1000, default_pool_size=25

Benefits: - Support 1000+ concurrent clients - Reduced connection overhead - Better resource utilization

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5. Structured Outputs Implementation

Current: SDK v6 supports structured outputs via Zod

Implementation: 1. Create Zod schemas for AI responses (src/backend/src/schemas/) 2. Update AI service calls to use zodResponseFormat 3. Add response validation middleware 4. Test all AI endpoints

Benefits: - Guaranteed valid JSON responses - Better TypeScript integration - Reduced parsing errors

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6. AI Usage Analytics Dashboard

Implementation: 1. Create AIMetrics model (track tokens, costs, latency) 2. Add analytics middleware to AI routes 3. Create analytics API endpoints (/api/analytics/ai) 4. Build dashboard UI component

Metrics to Track: - Cost by model/user/endpoint - Token usage trends - Latency percentiles (p50, p95, p99) - Error rates - Budget alerts

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🟢 Low Priority (Week 5-6)

7. Remove In-Memory LRU Cache

Current: Dual caching (in-memory + Redis)

Target: Single Redis strategy

Implementation: 1. Remove LRU cache from src/backend/src/index.ts (~150 LOC) 2. Standardize on Redis with TTL strategy 3. Implement cache middleware

Benefits: - 100MB memory savings per instance - Horizontal scaling support - Cache persistence across deployments

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8. UI Component Consolidation

Current: Two component systems (ui/ and ui-enhanced/)

Status: Needs audit to determine which is actively used

Implementation: 1. Audit component usage across pages 2. Consolidate to single system (likely ui-enhanced/) 3. Update imports 4. Remove duplicate directory

Expected Impact: - ~1,200 LOC reduction - Smaller bundle size - Consistent styling

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📊 Implementation Metrics

Metric	Before	After	Improvement
React Query	v3.x	✅ v5.62.12	Complete
OpenAI SDK	v3.x	✅ v6.15.0	Complete
LangGraph	None	✅ v1.0.5	Complete
pgvector (backend)	v0.1.4	v0.8.0 (pending)	9x faster
pgvector (Python)	v0.2.3	v0.8.0 (pending)	9x faster
FastAPI	v0.98.0	v0.115.x (pending)	Security fix
Agent Files	16 files	8 files (pending)	-50% complexity
Caching Systems	2 systems	1 system (pending)	-100MB RAM

🚀 Deployment Plan

Phase 1: Database & Dependencies (Week 1)

1. ✅ Verify React Query v5 compatibility
2. ✅ Verify OpenAI SDK v6 compatibility
3. ⏳ Upgrade pgvector to 0.8.0
4. ⏳ Upgrade FastAPI to 0.115.x
5. ⏳ Run database migrations
6. ⏳ Performance testing

Phase 2: Agent Consolidation (Week 2)

1. ⏳ Integrate langgraph_production.py
2. ⏳ Archive legacy agents
3. ⏳ Update imports and references
4. ⏳ Test multi-agent workflows
5. ⏳ Monitor token costs

Phase 3: Infrastructure (Week 3)

1. ⏳ Add pgBouncer to Docker setup
2. ⏳ Implement structured outputs
3. ⏳ Add AI analytics middleware
4. ⏳ Remove in-memory cache
5. ⏳ Performance benchmarking

Phase 4: Final Testing (Week 4)

1. ⏳ End-to-end testing
2. ⏳ Load testing
3. ⏳ Security audit
4. ⏳ Documentation updates
5. ⏳ Production deployment

📚 Research Sources Consulted

React Query v5

- TanStack Query v5 Migration Guide
- Announcing TanStack Query v5

OpenAI SDK v4+

- OpenAI Node SDK v4 Migration
- Structured Outputs Guide

pgvector 0.8.0

- AWS: pgvector 0.8.0 Performance
- HNSW Indexes with Postgres

LangGraph 1.0

- LangGraph Memory Management
- PostgreSQL Checkpointer
- Mastering LangGraph Checkpointing 2025

🎯 Success Criteria

- [ ] pgvector upgraded to 0.8.0 with HNSW indexes
- [ ] Vector search queries 9x faster
- [ ] FastAPI upgraded to 0.115.x
- [ ] Legacy agents archived (6 files removed)
- [ ] LangGraph production workflow active
- [ ] Token costs reduced by 30-50%
- [ ] Structured outputs implemented
- [ ] AI analytics dashboard deployed
- [ ] pgBouncer connection pooling active
- [ ] Single Redis caching strategy
- [ ] All tests passing
- [ ] Performance benchmarks met

Next Steps: 1. Begin pgvector upgrade 2. Create migration SQL script 3. Update package dependencies 4. Test vector search performance 5. Proceed with agent consolidation

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