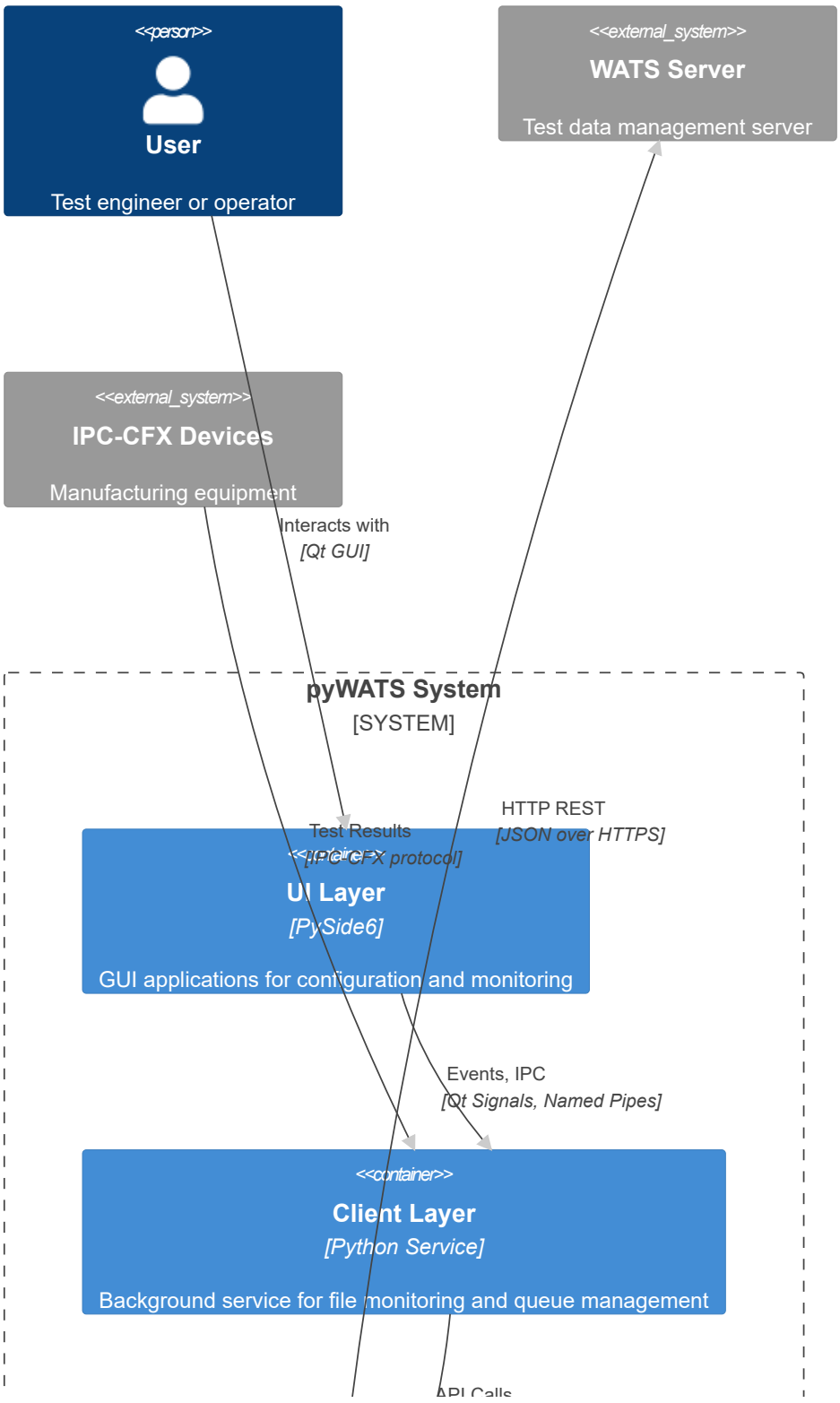
Component Diagrams - API-Client-UI Architecture

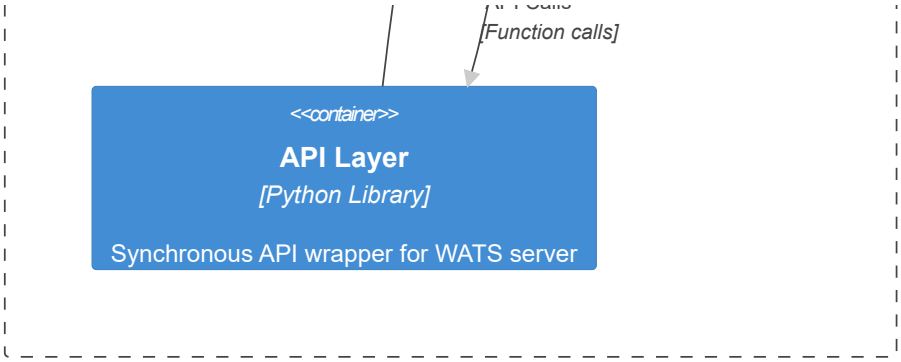
Date: February 8, 2026

This document contains comprehensive component diagrams showing class hierarchies, system architecture, and component relationships.

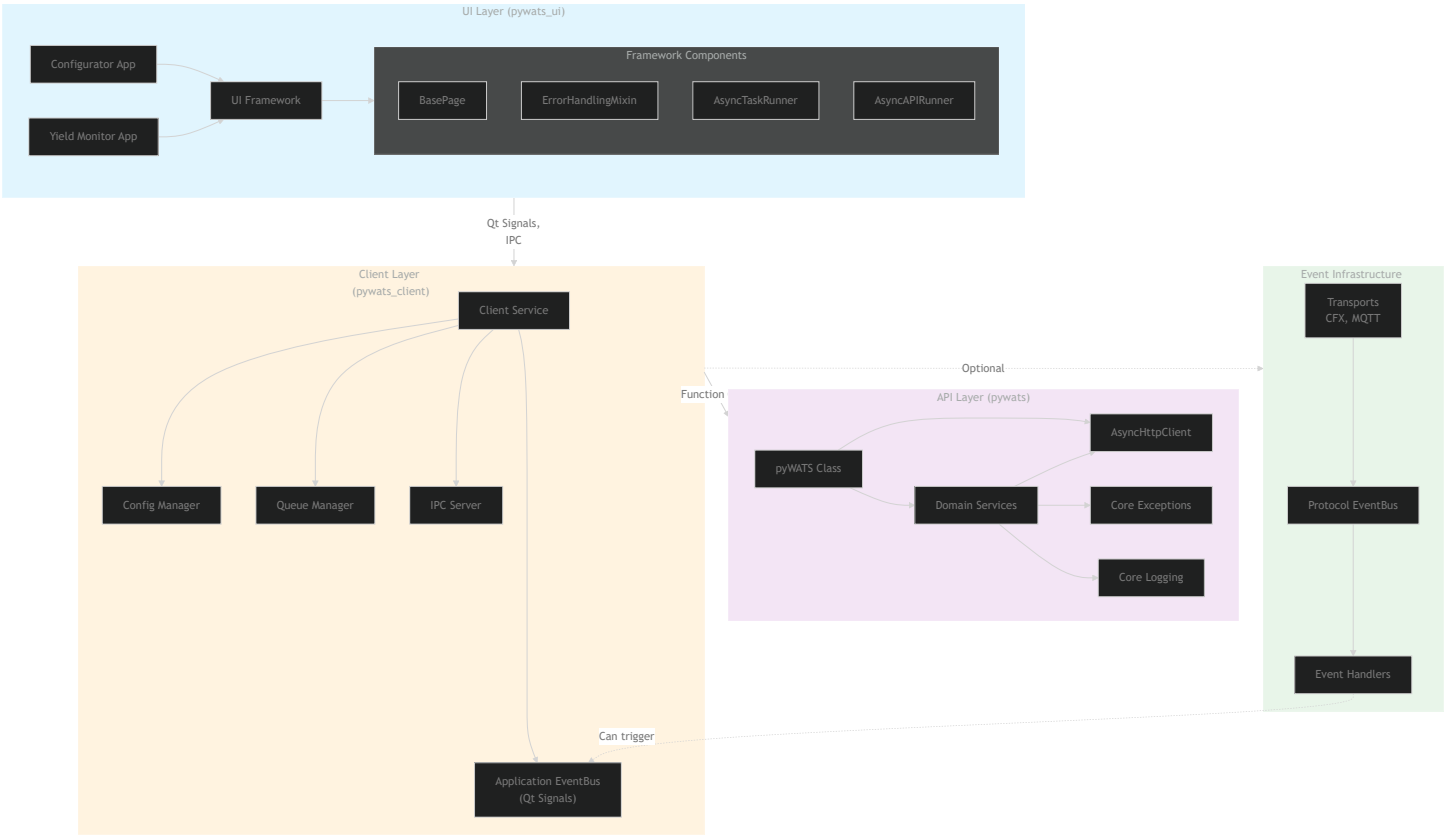
1. Three-Layer System Architecture

System Context - pyWATS Three-Layer Architecture

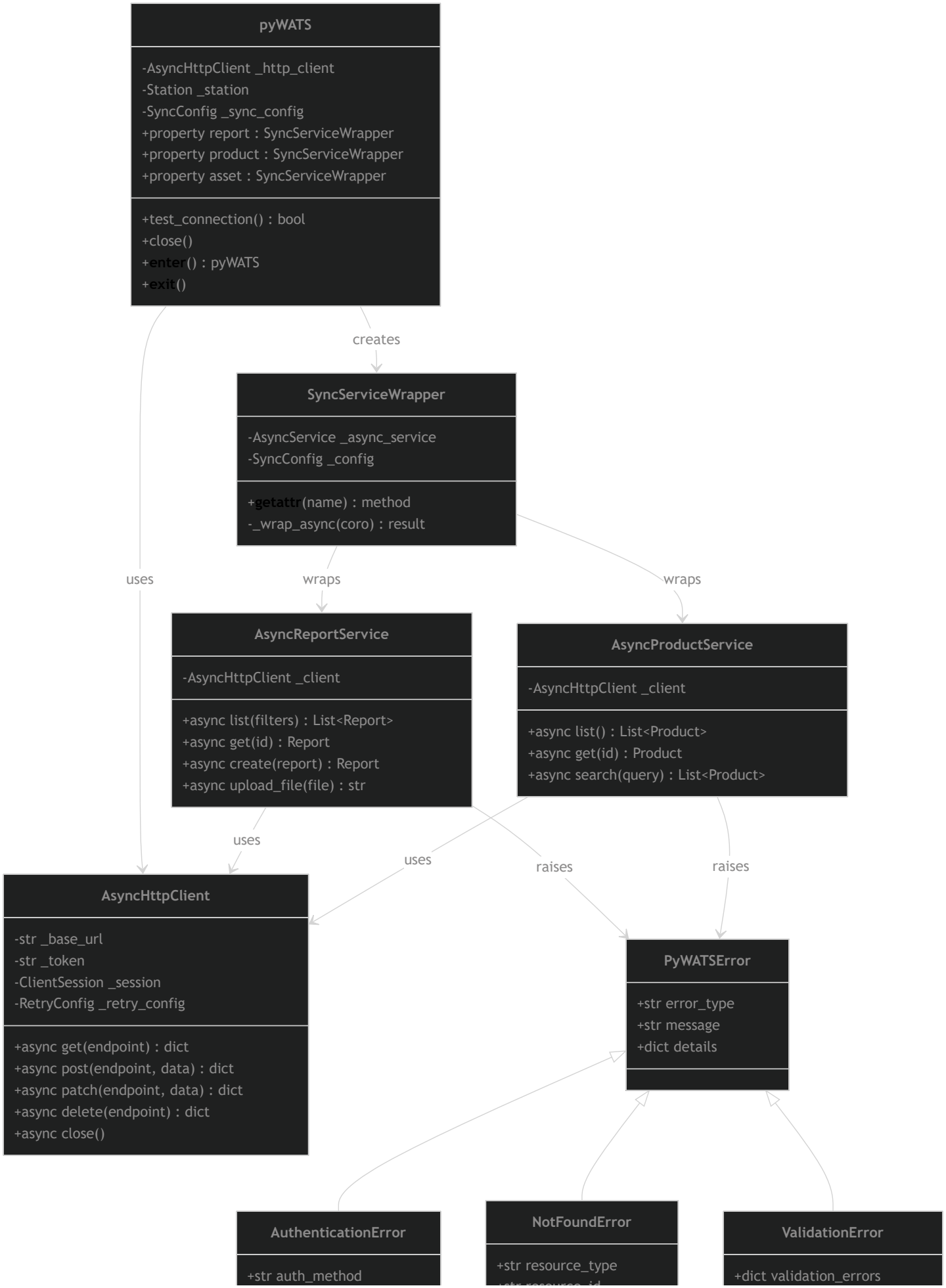




2. Layer Component View

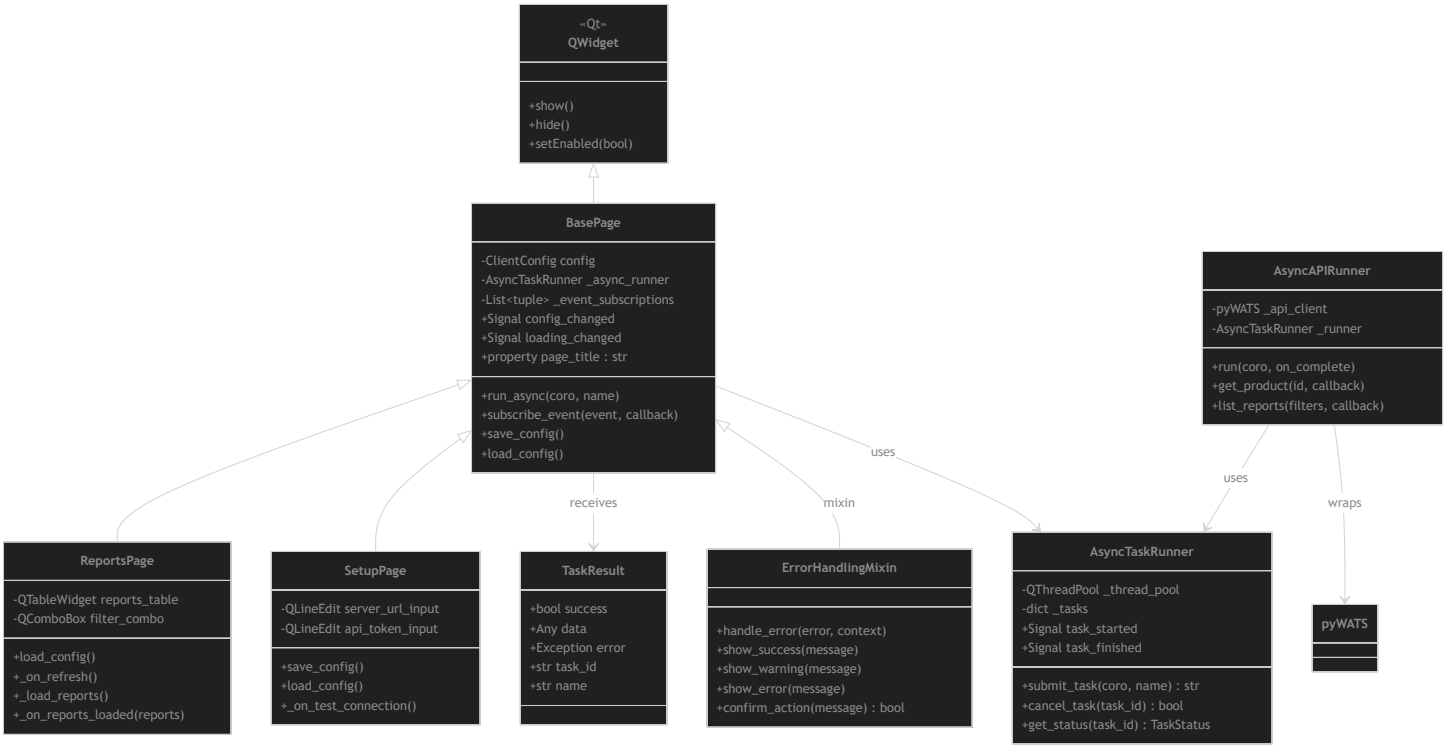


3. Class Hierarchy - API Layer

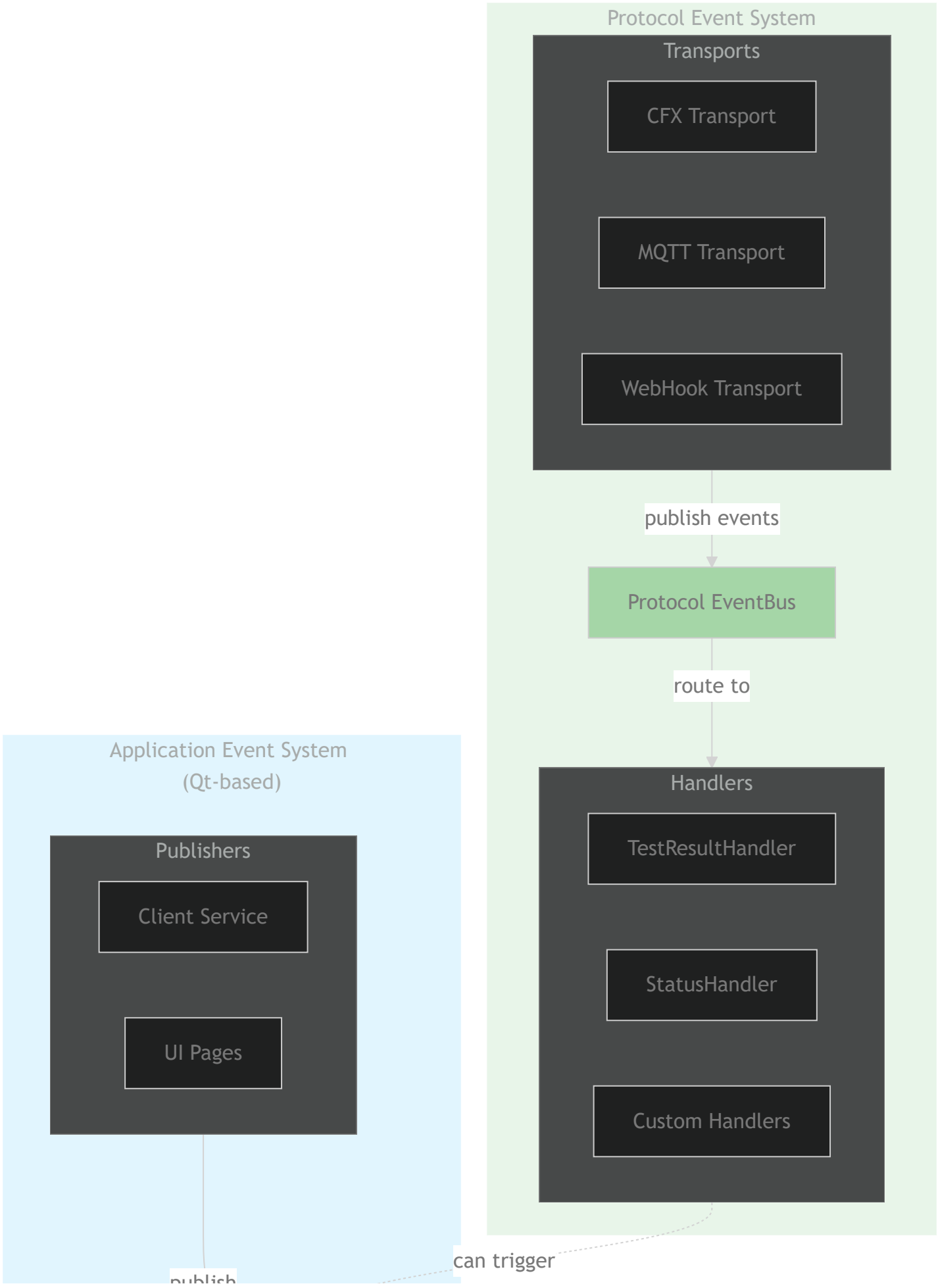

pyWATS
-AsyncHttpClient _http_client
-Station _station
-SyncConfig _sync_config
+property report : SyncServiceWrapper
+property product : SyncServiceWrapper
+property asset : SyncServiceWrapper
+test_connection() : bool
+close()
+enter() : pyWATS
+exit()
creates
SyncServiceWrapper
-AsyncService _async_service
-SyncConfig _config
+getattr(name) : method
-_wrap_async(coro) : result
uses
wraps
wraps
AsyncReportService
-AsyncHttpClient _client
+async list(filters) : List<Report>
+async get(id) : Report
+async create(report) : Report
+async upload_file(file) : str
AsyncProductService
-AsyncHttpClient _client
+async list() : List<Product>
+async get(id) : Product
+async search(query) : List<Product>
uses
uses
raises
raises
AsyncHttpClient
-str _base_url
-str _token
-ClientSession _session
-RetryConfig _retry_config
+async get(endpoint) : dict
+async post(endpoint, data) : dict
+async patch(endpoint, data) : dict
+async delete(endpoint) : dict
+async close()
PyWATSError
+str error_type
+str message
+dict details
AuthenticationError
+str auth_method
NotFoundError
+str resource_type
ValidationError
+dict validation_errors

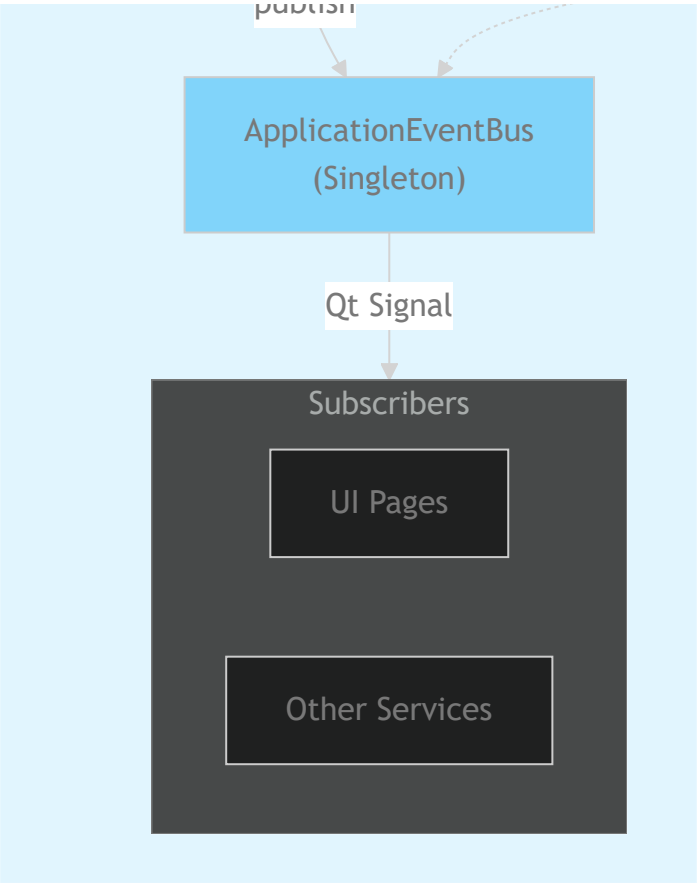
4. Class Hierarchy - Client Layer

5. Class Hierarchy - UI Framework

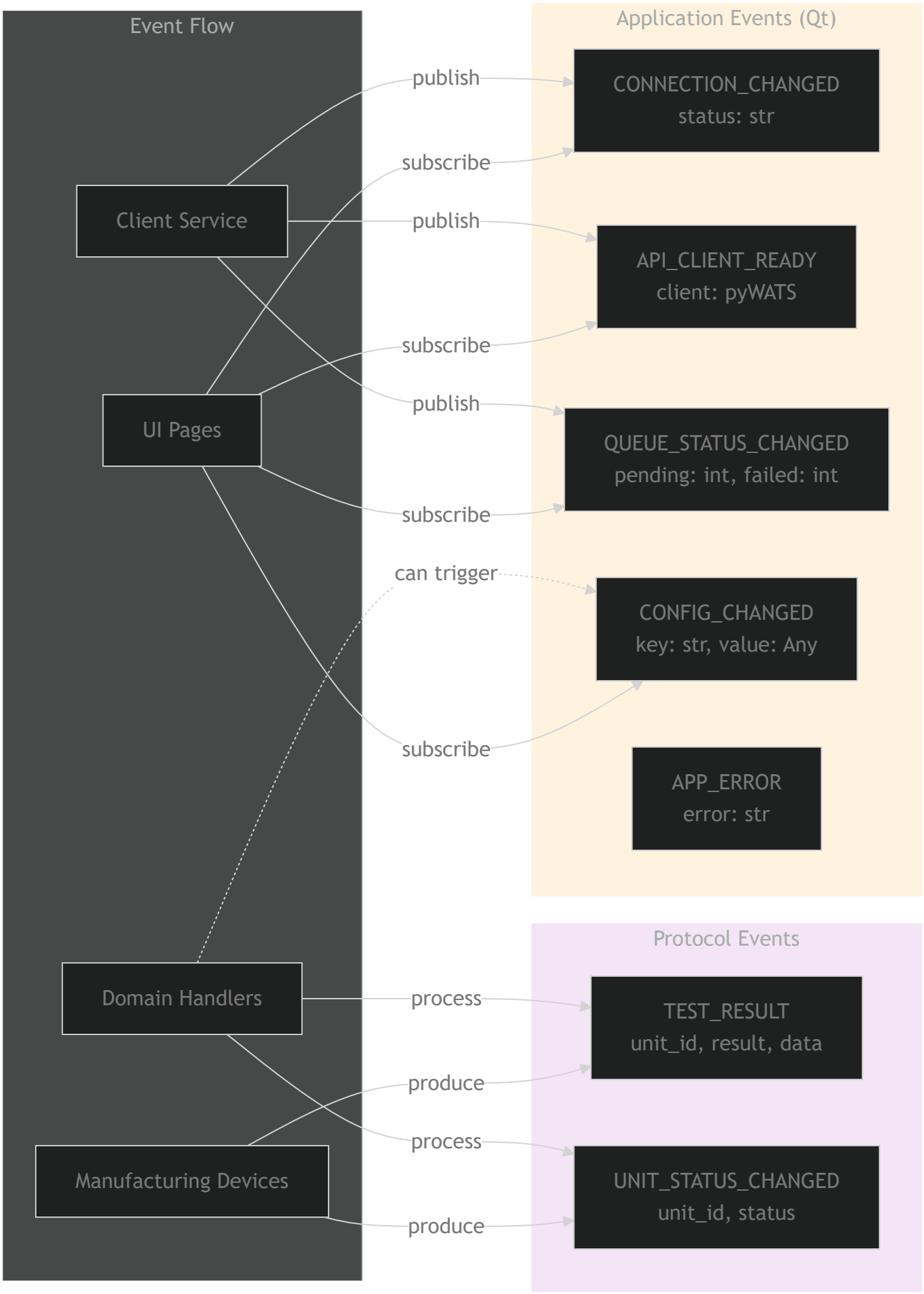


6. Event System Architecture

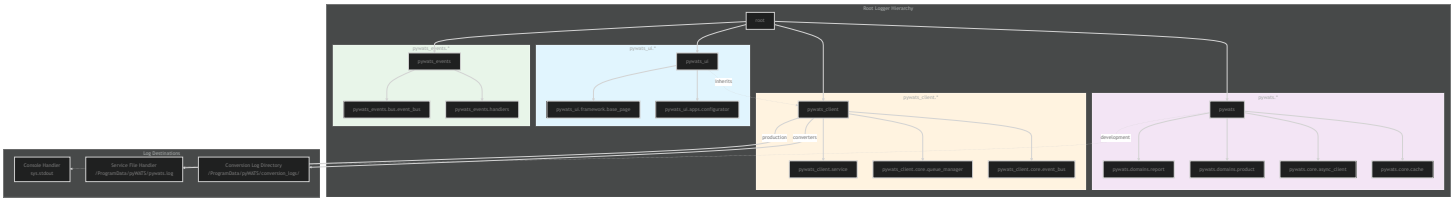

Protocol Event System
Transports
CFX Transport
MQTT Transport
WebHook Transport
publish events
Protocol EventBus
route to
Handlers
TestResultHandler
StatusHandler
Custom Handlers
Application Event System
(Qt-based)
Publishers
Client Service
UI Pages
can trigger


publish
ApplicationEventBus
(Singleton)
Qt Signal
Subscribers
UI Pages
Other Services

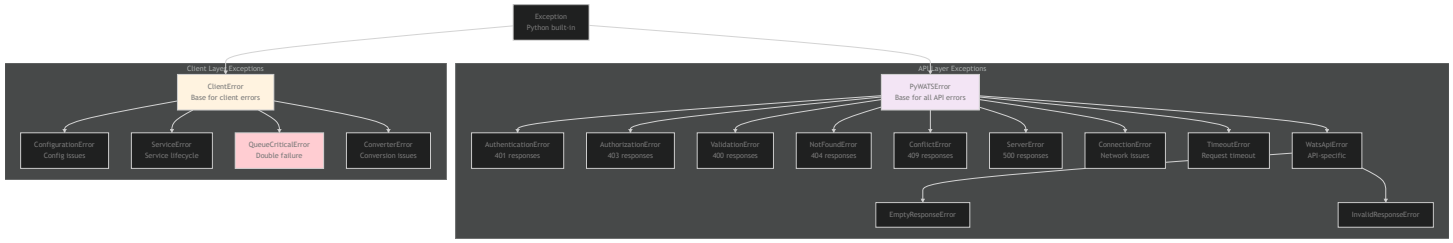
7. Event Type Hierarchy


Event Flow
Application Events (Qt)
CONNECTION_CHANGED
status: str
publish
subscribe
Client Service
publish
API_CLIENT_READY
client: pyWATS
subscribe
UI Pages
publish
QUEUE_STATUS_CHANGED
pending: int, failed: int
subscribe
can trigger
CONFIG_CHANGED
key: str, value: Any
subscribe
APP_ERROR
error: str
Protocol Events
Domain Handlers
process
TEST_RESULT
unit_id, result, data
produce
process
Manufacturing Devices
UNIT_STATUS_CHANGED
unit_id, status
produce

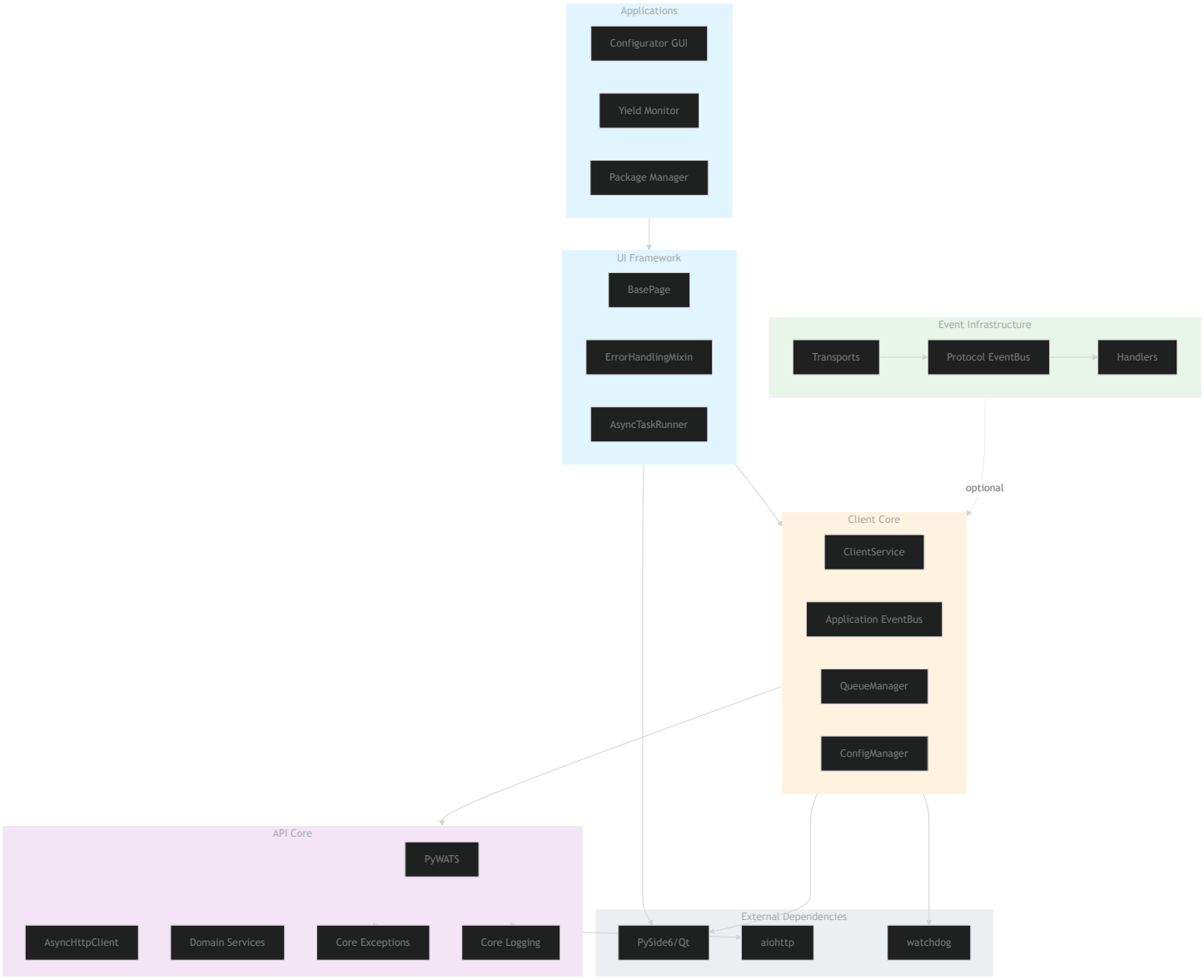
8. Logging Architecture



9. Exception Hierarchy



10. Dependency Graph



11. Component Communication Matrix

From ↓ To →	UI Layer	Client Service	Application EventBus	API Layer	Protocol EventBus
UI Layer	-	IPC calls, Config updates	Subscribe, Publish	Direct calls (degraded mode)	-

From ↓ To →	UI Layer	Client Service	Application EventBus	API Layer	Protocol EventBus
Client Service	-	-	Publish events	Direct calls	Optional: Trigger app events
Application EventBus	Qt Signals	Qt Signals	-	-	-
API Layer	Return values, Exceptions	Return values, Exceptions	-	-	-
Protocol EventBus	-	Via handlers	Via handlers	-	-

Last Updated: February 8, 2026