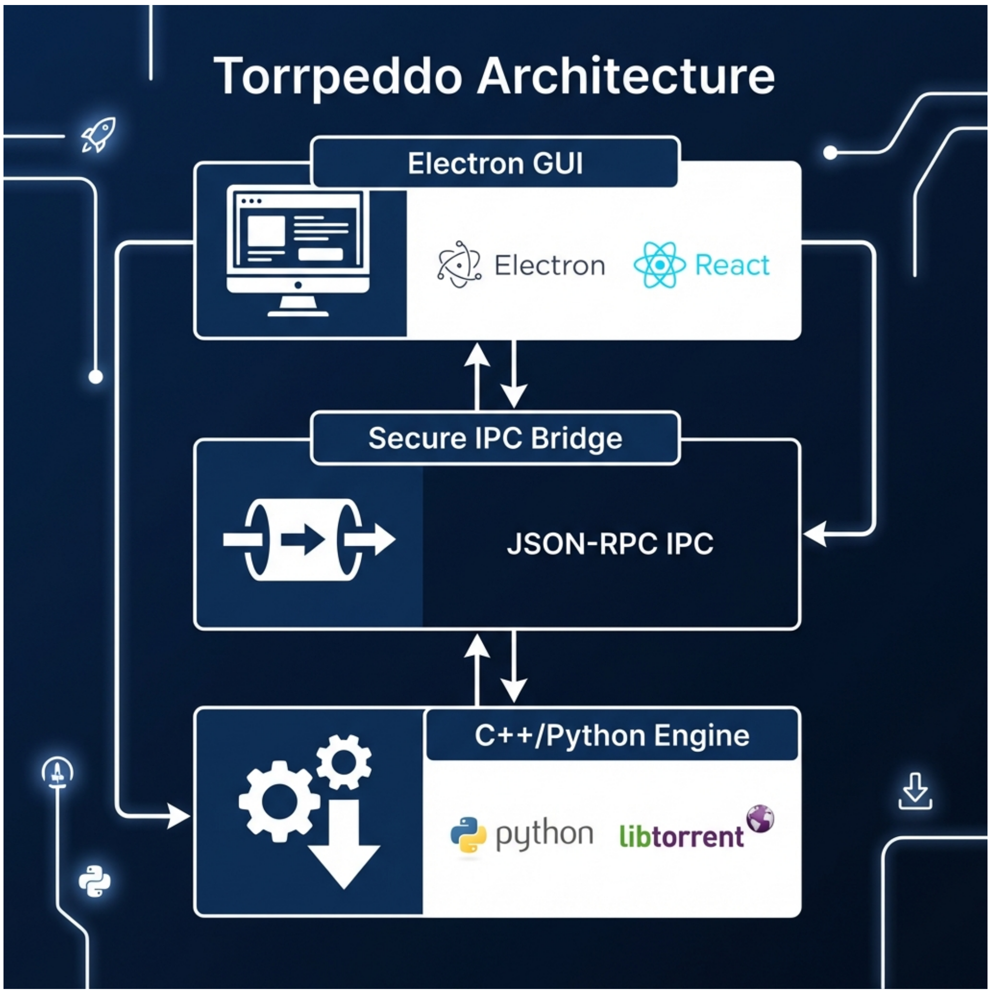
TORRPEDDO PROJECT BOOK



Executive Summary

Torrpeddo is an industrial-grade, premium torrent client designed for the modern desktop. Built primarily with Python and the Electron framework, Torrpeddo leverages the powerful libtorrent suite to offer a seamless, high-performance experience that bridges the gap between complex network protocols and professional user interfaces.

Architectural Deep Dive

Torrpeddo follows a decoupled architectural pattern, separating the presentation layer from the core logic and network engine. This is achieved through three primary layers:

1. Frontend: Electron Framework

Overview: What is Electron?

Electron is an open-source framework developed by GitHub that allows developers to build cross-platform desktop applications using web technologies: HTML, CSS, and JavaScript. It combines the Chromium rendering engine (for the UI) and the Node.js runtime (for system-level access).

Benefits for Torrpeddo

- Visual Excellence: Leveraging the full power of modern CSS and web components to create a "WOW" factor UI that feels premium. - Cross-Platform Compatibility: A single codebase provides a consistent experience across Linux, Windows, and macOS. - Native Experience: Provides access to native OS features like file dialogs, tray notifications, and filesystem integration.

2. The Bridge: IPC (Inter-Process Communication)

Concept: What is IPC?

IPC, or Inter-Process Communication, is a mechanism that allows different processes to share data and coordinate actions. In Torrpeddo, we use a custom IPC bridge to connect the Electron frontend with the Python backend.

Implementation: Secure JSON-RPC

Communication is handled via a JSON-RPC protocol over stdin/stdout channels. - The Electron process spawns a dedicated Python child process. - Commands (e.g., add_magnet, get_status) are serialized into JSON strings and sent to the Python process. - The Python process executes the logic and returns a structured JSON response.

Advantages of the IPC Bridge

- Decoupling: The engine can be updated, debugged, or even replaced without touching the UI.

- Security: The backer
isolation.

3. Backend Engine: Python & libtorrent

The Core: libtorrent with Python Bindings

At the heart of Torrpeddo is libtorrent, a feature-complete BitTorrent implementation. While the underlying engine is implemented in high-performance C++, Torrpeddo utilizes the official Python bindings for rapid development and seamless integration with the bridge logic.

Multi-threaded Performance

- Engine Level: The libtorrent 2.0+ engine utilizes an internal thread pool for disk I/O, network polling, and piece validation. This allows for parallel processing of multiple torrent fragments simultaneously.

- Manager Level: The
handle non-blocking to
stalls while metadata is

Development Process & Methodology

The Torrpeddo project followed a "Platform-First" methodology:

Phase 1: Language Choice

Python was selected for its extensive library support and ease of integration with libtorrent and IPC protocols.

Phase 2: Engine Validation

Rigorous testing of libtorrent benchmarks to ensure maximum throughput on varied hardware.

Phase 3: Bridge Optimization

Implementation of non-blocking I/O in the IPC bridge to prevent UI "micro-stutters".

Phase 4: Packaging & Distribution

Integration of electron-builder and PyInstaller to create unified, single-binary distributors for end-users.
