BPToCppExporter Plugin

The BPToCppExporter is a specialized utility designed for Unreal Engine developers to facilitate the transition from Blueprint-based prototyping to high-performance C++ implementation. By automating the conversion process, it ensures that game logic remains efficient while maintaining the flexibility of the Blueprint visual scripting system.

Key Features

- Automated Translation: Converts standard Blueprint nodes and logic flows directly into clean, human-readable C++ code.
- Performance Optimization: Significantly reduces CPU overhead by moving logic from the Blueprint Virtual Machine to native execution.
- Header Management: Automatically analyzes dependencies and generates the necessary #include statements for the exported classes.
- Property Mapping: Correctly maps variables with appropriate UPROPERTY macros, including support for categories, tooltips, and access specifiers.
- Function Signature Preservation: Maintains the original function names and parameter types to ensure compatibility with existing game systems.

Architecture

The plugin architecture is built upon three primary modules that work in sequence to ensure a lossless conversion of the Blueprint graph.

1. Blueprint Parser

The parser traverses the UBlueprint asset, identifying all UK2Node instances. It builds a logical map of the execution flow and data pins, resolving any macros or collapsed graphs into their constituent parts.

2. Intermediate Representation (IR)

Before code generation, the plugin creates an IR that represents the logic in an engine-agnostic format. This layer allows for optimizations such as removing redundant nodes and simplifying pure function chains.

3. Code Emitter

The emitter uses a series of templates to generate the final .h and .cpp files. It leverages the Unreal Header Tool (UHT) standards to ensure the generated code is immediately ready for compilation.

Technical Specifications

Component	Functionality	Target
Logic Mapper	Maps K2Nodes to C++ Statements	Logic Flow
Type Resolver	Matches BP Types to C++ Structs/Classes	Data Types
Macro Processor	Expands BP Macros into Inline Code	Optimization
Include Finder	Locates Header Files for Classes/Enums	Dependencies

Usage Workflow

To utilize the exporter within the Unreal Editor, follow these standard procedures:

1. **Select Asset**: Locate the Blueprint asset in the Content Browser.

2. **Invoke Exporter**: Right-click the asset and select **Actions > Export to C++**.
3. **Configuration**: In the popup dialog, specify the target Module (e.g., ProjectNameEditor or ProjectName) and the desired source folder.
4. **Generation**: Click **Export**. The plugin will generate the header and source files.
5. **Recompile**: Run a Live Coding recompile or restart the editor to integrate the new native class.