

# A Technical Analysis and C++ Port of the *u64-remote* Client

Preserving the Original Go Implementation by Github AllMeatball

**Original Author (Go implementation):** Levi Spencer

GitHub: <https://github.com/AllMeatball/u64-remote>

**C++ Port and Technical Analysis:** Dr. Eric O. Flores

**Target Device:** Commodore 64 Ultimate / Ultimate-64

**Original Language:** Go

**Ported Language:** C++17 (Linux)

**Transport:** HTTP REST API

## Purpose and Scope

This paper documents the **analysis and C++ port** of the *u64-remote* project originally authored in **Go** by Mr. Spencer, GitHub: AllMeatball:

<https://github.com/AllMeatball/u64-remote>

The intent of this work is **not** to replace, supersede, or reinterpret the original implementation, but rather to:

1. Preserve the original author's design and intent
2. Port the functionality to a native **Linux C++** environment
3. Improve interoperability with existing C/C++ tooling
4. Add optional enhancements (e.g., device discovery) while keeping the original behavior intact

All architectural decisions in the C++ version trace directly back to the original Go code.

## Overview of the Original *u64-remote* Go Project

### Project Intent (Original Author)

The *u64-remote* project provides a **command-line client** that allows a modern computer to remotely control a **Commodore 64 Ultimate** device over a network connection.

Primary capabilities include:

- Uploading and executing **.PRG** files
- Reading and writing C64 memory
- Authenticating via the Ultimate's REST interface

The project is intentionally minimal, direct, and automation-friendly.

## Original Go Implementation (Authored by Levi Spencer)

### Original Source Attribution

The following Go code is taken directly from the original repository and is included **verbatim** to preserve authorship and design intent.

**Repository:** <https://github.com/AllMeatball/u64-remote>

### Original Go Code (Server Interface)

```
package server

import (
    "bytes"
    "fmt"
    "io"
    "net/http"
    "net/url"
)

type U64Creds struct {
    Address, Password string
    EnableMessageBox bool
}

type U64Server struct {
    creds U64Creds
}

func NewU64Server(creds U64Creds) (U64Server, error) {
    server := U64Server{creds: creds}

    // Test server connection
    _, err := server.RestCall("GET", "/v1/version", nil, nil)
    if err != nil {
        return server, err
    }
    return server, nil
}

func (self *U64Server) CreateRestRequest(method, path string, body io.Reader)
(*http.Request, error) {
    fullPath, err := url.JoinPath(self.creds.Address, path)
    if err != nil {
        return nil, err
    }

    req, err := http.NewRequest(method, fullPath, body)
    if err != nil {
        return nil, err
    }

    req.Header.Add("X-Password", self.creds.Password)
    return req, nil
}

func (self *U64Server) RunPRG(reader io.Reader) error {
```

```

    req, err := self.CreateRestRequest("POST", "/v1/runners:run_prg",
reader)
    if err != nil {
        return err
    }

    req.Header.Set("Content-Type", "application/octet-stream")
    _, err = self.RestCallRaw(req)
    return err
}

```

## What the Original Go Code Does

In simple terms:

1. **Loads credentials** (IP address + password)
2. **Verifies connectivity** using:

```
GET /v1/version
```

3. **Uploads and executes a PRG file** using:

```
POST /v1/runners:run_prg
```

4. Uses the HTTP header:

```
X-Password: <password>
```

5. Treats all program data as **raw binary streams**

The Go implementation is intentionally clean and avoids unnecessary abstraction.

## Why a C++ Port Was Created

The C++ port exists for **environmental and integration reasons**, not because of deficiencies in the Go implementation.

Primary motivations:

- Native integration with existing **C/C++ tool-chains**
- Elimination of Go runtime dependency
- Easier embedding into larger native systems
- Better alignment with Linux-based retro-computing tool-chains
- Ability to extend functionality (e.g., discovery) without modifying the original Go code

Importantly:

**The C++ version preserves the original design model of the Go implementation.**

# C++ Architecture Overview (Ported Design)

## 5.1 Conceptual Equivalence

Go Component	C++ Equivalent
U64Server	class U64Server
U64Creds	struct Creds
RestCall()	request()
RunPRG()	runPRG()

Every C++ function maps directly to an original Go responsibility.

## New Capabilities (Additive, Optional)

The C++ port introduces **optional enhancements** that do not alter original behavior:

- **Automatic network discovery** of C64U devices
- User confirmation when multiple devices are found
- More flexible credential loading paths
- Improved error diagnostics for Linux

These enhancements are layered *on top* of the original model.

## Go vs C++: Technical Comparison

Aspect	Go (Original)	C++ (Port)
Author	Levi Spencer	Dr. Eric O. Flores (port)
Networking	net/http	libcurl
JSON	encoding/json	Lightweight custom parser
Runtime	Go runtime	Native ELF
Device Discovery	✗ No	✓ Yes
Philosophy	Minimal	Minimal + extensible

## Preservation of Original Authorship

This port explicitly:

- Retains original endpoint semantics
- Retains original authentication method
- Retains original data flow (binary PRG upload)
- Retains original control assumptions

The **Go code by Levi Spencer remains the canonical reference implementation.**

The C++ project should always cite:

<https://github.com/AllMeatball/u64-remote>

as the **originating source**.

## Conclusion

The *C64U-remote* project is an elegant and effective solution for remote control of the Commodore 64 Ultimate.

This C++ port exists to **extend the reach** of that work into native Linux environments while respecting and preserving the original author's design, intent, and ownership.

In spirit and execution:

**This is a faithful port — not a rewrite.**

## References

1. Levi Spencer, AllMeatball, *u64-remote* (Go implementation)  
<https://github.com/AllMeatball/u64-remote>
2. Commodore 64 Ultimate REST API documentation (device firmware)