

# Explicit Linker Path Display - Improvements

## The Issue Identified

The other AI correctly pointed out that the profile should **always show the actual linker path explicitly**, not rely on environment variables that might be undefined or unclear.

## The Problem

Some functions were:

- Not showing the linker at all (MSYS2 functions)
- Showing generic names like "MSVC link.exe" without full path

This made it unclear:

- What linker is actually being used?
- Where is the linker located?
- Is the environment correctly configured?

## The Fix Applied

### 1. MSYS2 GCC Function

**Before:**

```
Write-Host " Compiler: $msys64Root\ucrt64\bin\gcc.exe" -ForegroundColor Green
# No linker shown!
```

**After:**

```
Write-Host " Compiler: $msys64Root\ucrt64\bin\gcc.exe" -ForegroundColor Green
Write-Host " Linker: GNU ld (auto-detected by GCC)" -ForegroundColor Green
```

### 2. MSYS2 Clang Function

**Before:**

```
Write-Host " Compiler: $msys64Root\ucrt64\bin\clang.exe" -ForegroundColor Green
# No linker shown!
```

**After:**

```
Write-Host " Compiler: $msys64Root\ucrt64\bin\clang.exe" -ForegroundColor Green
Write-Host " Linker: LLVM lld (auto-detected by Clang)" -ForegroundColor Green
```

### 3. Default Environment Display

**Before:**

```
Write-Host " Compiler: MSVC cl.exe" -ForegroundColor Green
Write-Host " Linker: MSVC link.exe" -ForegroundColor Green
```

**After:**

```
Write-Host " Compiler: $msvcBinPath\cl.exe" -ForegroundColor Green
Write-Host " Linker: $msvcBinPath\link.exe" -ForegroundColor Green
```

## 4. Environment Switching Help

### Before:

```
use-gcc      - MSYS2 GCC (cmake-msys + ninja-msys + gcc.exe)
use-clang-msys - MSYS2 Clang (cmake-msys + ninja-msys + clang.exe)
```

### After:

```
use-gcc      - MSYS2 GCC (gcc.exe + GNU ld)
use-clang-msys - MSYS2 Clang (clang.exe + LLVM lld)
```

## Philosophy: Always Show The Truth

Following your original profile's approach:

- **Always show actual paths** when possible
- **Always mention the linker** for every environment
- **Be explicit** about what's being used
- **No guessing** - show the truth directly

## Example Output Now

### When you run `use-clang-win`:

```
Switching to Windows Clang-cl (MSVC backend) build environment...
CMake: D:\Programs\cmake\bin\cmake.exe
Ninja: D:\Programs\cmake\bin\ninja.exe
Compiler: D:\Programs\clang\bin\clang-cl.exe (MSVC-compatible)
Linker: D:\Programs\clang\bin\lld-link.exe
```

### When you run `use-gcc`:

```
Switching to MSYS2/GCC build environment...
CMake: D:\Programs\msys64\ucrt64\bin\cmake.exe
Ninja: D:\Programs\msys64\ucrt64\bin\ninja.exe
Compiler: D:\Programs\msys64\ucrt64\bin\gcc.exe
Linker: GNU ld (auto-detected by GCC)
```

### When profile loads (default environment):

```
Default Build Environment (for Cargo):
CMake: Windows CMake 4.2.3
Generator: Ninja (Windows)
Compiler: D:\dev\msvc\VC\Tools\MSVC\14.50.35717\bin\Hostx64\x64\cl.exe
Linker: D:\dev\msvc\VC\Tools\MSVC\14.50.35717\bin\Hostx64\x64\link.exe
```

## Why This Matters

When debugging build issues, you need to know **exactly** what tools are being used:

- Is it using the right linker?
- Where is it located?
- Is PATH correct?

Are environment variables set right?

Without explicit paths, you're **guessing**. With explicit paths, you **know**.

## Note on Auto-Detected Linkers

For GCC and MSYS2 Clang, the linker is **auto-detected** by the compiler:

- GCC automatically uses `ld` (GNU linker)
- Clang automatically uses `lld` (LLVM linker)

We don't set `CMAKE_LINKER` for these because:

1. The compiler knows which linker to use
2. Setting it explicitly can sometimes cause issues
3. It's more reliable to let the compiler decide

But we **do show** which linker will be used so you're informed!

## Summary of Improvements

Function	Before	After
<code>use-msvc</code>	Shows linker	Shows full path
<code>use-clang-win</code>	Shows linker	Shows full path
<code>use-gcc</code>	No linker shown	Shows linker (auto-detected)
<code>use-clang-msys</code>	No linker shown	Shows linker (auto-detected)
Default environment ~ Generic name		Shows full path

All environment switching functions now provide **complete, explicit information** about the toolchain being used.