



BAHIR DAR UNIVERSITY

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Principles of Compiler Design

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ASSIGNMENT 3

Detect null dereferencing statically when possible.

Goal: Catch errors before running the program.

Approach

1. Track each variable as:
 - a. **NULL** → definitely null
 - b. **NON_NULL** → definitely not null
 - c. **UNKNOWN** → may or may not be null
2. Propagate this **nullness information** through the program.
3. If a variable is **proven NULL** and is dereferenced → report a **compile-time error**.

`x = null; // x → NULL`

`x = new Object(); // x → NON_NULL`

`x = y; // x → same as y`

Dereference: `x->field;`

- If `x = NULL` → error
- If `x = NON_NULL` → safe
- If `x = UNKNOWN` → ignore

Example: `c++ p = null;`

`q = p;`

`x = q->field;`

`p = NULL`

`q = p → NULL`
`q->field → variable is NULL → error`

