Goto, Exceptions, and Assembly in C

CS 2022: Introduction to C

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(based on slides by Saikat Guha)

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Switch Statement

- N-way if (N > 2), but equality check only
- Only integers
  - But then many things in C are glorified integers
  - Notably, enums
enum days {Sun, Mon, Tue, Wed, Thu, Fri, Sat};
...
enum days day = ...;
switch (day) {
    case Sat:
        ...
        break;
    case Sun:
        ...
        break;
    case Mon:
        printf("Sounds like someone has a case of the Mondays.\n");
    case Wed:
    case Fri:
        ...
        break;
    default:
        ...
}
Goto

- Unstructured control flow
  - (unlike if, switch, for etc.)
- Evil
- Except when it’s not
- Especially, when it is the cleanest
Goto

...  
goto foo;  
...  

foo:  
...
Goto

Extremely useful for

- breaking out of deeply nested loops
- handling errors and exceptions
  - by writing code that cleans up resources in reverse order of allocation
  - and jumping to the correct position in the list if allocation fails at some point
Exceptions (kinda)

- To break out of a deep call stack quickly
- Think goto breaking out of deep loops, but applied to function calls
Exceptions (kinda)

- To break out of a deep call stack quickly
- Think goto breaking out of deep loops, but applied to function calls
- `setjmp` and `longjmp`
Inline Assembly

- For when no C statement exists for the task
- Or when the compiler isn’t generating the assembly you want

```
asm("...assembly code..."); // Basic form

asm("code" : output); // Assembly -> C

asm("code" : ... : input); // C -> C
```

For more info check out:
http://www.ibiblio.org/gferg/ldp/GCC-Inline-Assembly-HOWTO.html