CSE 3302 Notes 8: Statement-Level Control Structures

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8.1. INTRODUCTION

Dijkstra -

"The prisoner falls in love with his chains."

"A programming language is a tool that has a profound influence on our thinking habits."

Some much-maligned control structures

goto (and its alterable versions - COBOL)

break/continue

`switch` (or long if/else if chains) - when used in superclass to avoid touching subclasses

continuations (goto + state?)

(Aside: Knuth, "Structured Programming with go to Statements", esp. the acks
http://dl.acm.org.ezproxy.uta.edu/citation.cfm?doid=356635.356640)

8.2. SELECTION STATEMENTS

Special syntax for if ... then ... else ... and avoiding dangling else

Switch

Generality of individual expressions

(small) integer values

JavaScript - general expressions and equality tests

Implementation

O(1) - table/hashtable
O(log n) - binary search
O(n) - like corresponding ifs (JavaScript)

Also, see Duff's device for exploiting C `case` fall-through property:

http://en.wikipedia.org/wiki/Duff's_device

8.3. ITERATIVE STATEMENTS

Enumeration-controlled ("for")

Just a special syntax for "while" *or* should number of iterations be predictable at onset?

Other issues:

Jumping into or out-of loop?

Is expression that index variable is tested against required to be constant?

Modifying index variable inside body?

Predictable value of index variable after loop termination?

Iterators - container abstraction

Comparing two binary search trees?

Functional language iterators (see continuations in next section)

Logically-controlled

Aside: Backtrack programming and combinatorics
http://dl.acm.org.ezproxy.uta.edu/citation.cfm?doid=361219.361224

8.4. UNCONDITIONAL BRANCHING

gotos - multiple level break within function

Aside: Multilevel returns/Signals (and `setjmp`/`longjmp`)/Exceptions (
http://ranger.uta.edu/~weems/NOTES3302/signal.c)

Continuations (more later) - `call/cc` = call with current *continuation*

http://matt.might.net/articles/programming-with-continuations--exceptions-backtracking-search-threads-generators-coroutines/

Some examples:

http://ranger.uta.edu/~weems/NOTES3302/continue.rkt