Lecture 7

Loops and Arrays

Feb 1 Tuesday 2:00-3:25 FCK D4

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Revision: Iteration continued and arrays

- Control flow diagrams
  - Has its own rules
    - Boxes, diamonds, and arrows
  - While do flowchart
  - Do while flowchart
- Typical variable usage inside iterations
  - Flag
  - Counter
  - Iteration/loop index
  - Temporary variables
- Arrays as collections of values
- Array index
- Array declarations
- Array initialization
- Looping over arrays
  - Loop index as Array index
- For loop
  - All at one place
    - Initialization, termination, step
- Control flow diagram for 'for loop'- as exercise.
Control Flow Diagram for 'while loop'

- **Condition** $C$
  - false: Go to 'Body of Iteration $S$
  - true: Continue with loop
- **While** ($C$) $S$;
Control Flow Diagram for 'do while loop'

do S while (c);

S

termination Condition c

true

false
Control Flow Diagram for 'for loop'

Initialization
i=0;

Condition
i<n

Body of Iteration
S

Step
i++;
Array Storage

- int A[6];
- Total size of array:
  - no. of elements * size of each element
- If values are of type integer,
- Total size of the above array:
  - 6 * sizeof (int) bytes
  - i.e. 24 bytes all in all
- Indices are counted from 0 onwards
- Similarly, locations can be counted from 0 onwards

Start location of element no. 4 = ?
Start location of element no. 2 = ?
Int A[10];
    ....?
for (i=0; i<10; i++) {
    ...... ?
}

Nesting while/do while loops

While (..) {
    While (..) {
        ....
    }
}

}
Eliminate nesting if you can

• Can the inner nesting be merged with the outer nesting?
• Example problems from lab3
int A[10];
....?

for (i=0; i<10; i++) {
    for (j=0; j<10; i++) {
        ...... ?
    }
}

}
Making solutions to problems..

- Find min
- Find max
- Find second max
- Difference between max and min
- Sort increasing order
- Sort decreasing order
- Pi series, sine series, e series..
- Computing Average
- Cycle detection (each value indicates who's next)