CSI31 Introduction to Computer Programming I

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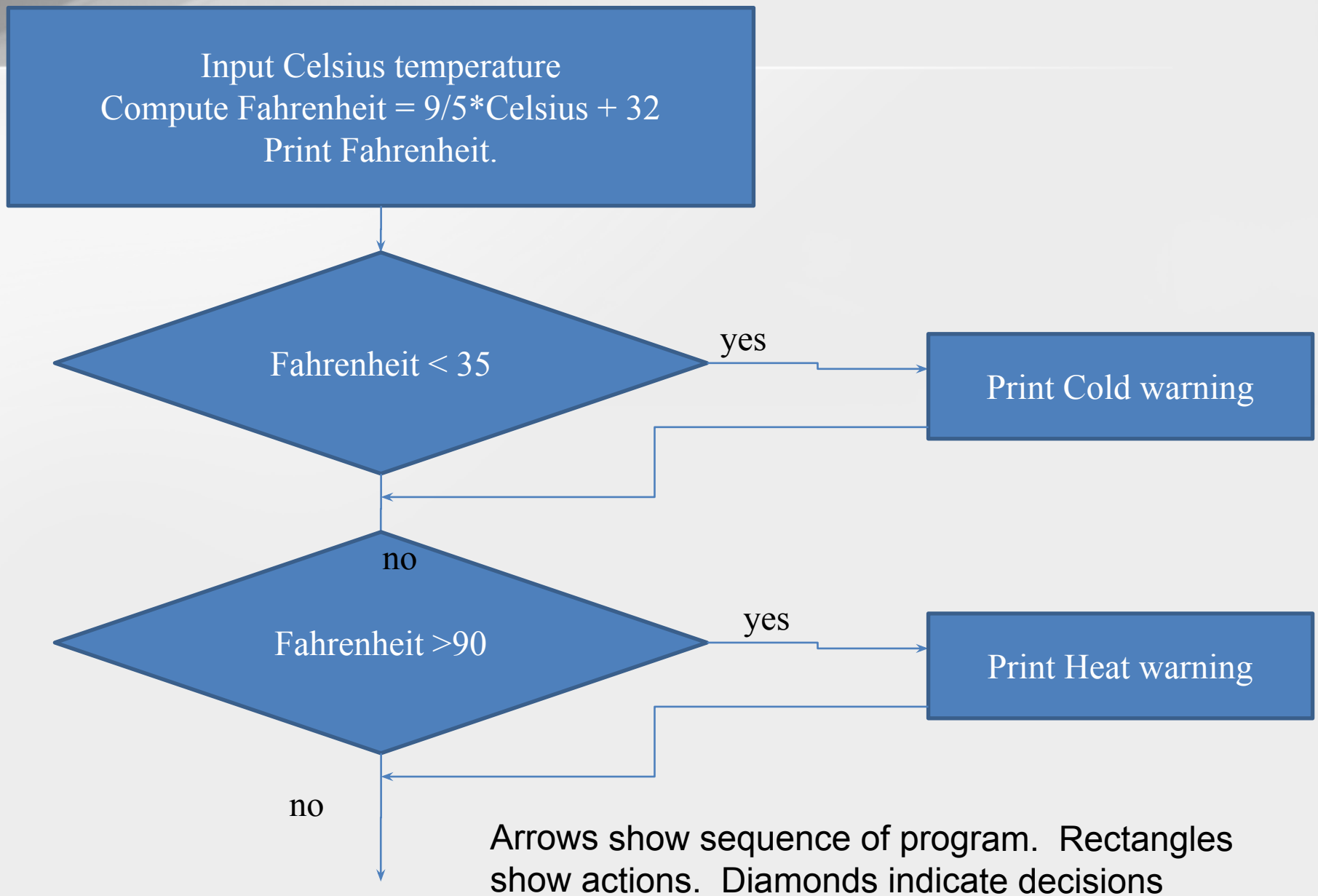
Decision structures

- The statements of a program are executed sequentially, except when the sequence is modified.
- Conditional execution: Execute statements when certain conditions are true.

Simple decision

- Return to the program to do temperature conversion of Chapter 2 convert.py. This one converts from Celsius to Fahrenheit.
- Enhance the program so it will print out a cold warning if the Fahrenheit temperature is below 30 degrees and a heat warning if the Fahrenheit temperature is above 90 degrees.
- Keyword if

Flow chart



Arrows show sequence of program. Rectangles show actions. Diamonds indicate decisions

Modify the code

- Syntax of if:

```
if <condition>:
    <body>
```

- The body of the if is indented.
- Simple decision semantics: if <condition> is true execute the statements of the body.

Condition is a Boolean expression

- A Boolean expression is an expression whose value is TRUE or FALSE.
- Simple comparison operators

Python	meaning		Python	meaning
<	Less than		>	Greater than
<=	Less than or equal to		>=	Greater than or equal to
==	Equal to		!=	Not equal tp

More on conditions

- Conditions may compare either text or strings.
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- Some examples?

Comparing strings of characters: <, >

- Order is based on the number of characters in the UNICODE numbers. For basic keyboard characters, that is the same as the ASCII numbering.
- https://ascii.cl/
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Two-way Decisions

- Look at program quadratic.py.
- Run some examples.
- Improve the programs to catch the case of non-real roots before it crashes the program.
- When do we have non-real roots?
  - When the discriminant < 0: no real roots
  - When discriminant >=0: compute the real roots
  - Two situations: test is TRUE, test is FALSE

Two-way decision: if/else

Syntax- note the body statements are indented.

```
if <condition>:
    <Statements executed if condition is True>
else:
    <Statements executed if condition is False>
```

- Semantics?

Program quadratic3.py