Decision Structures

Rose-Hulman Institute of Technology

Computer Science and Software Engineering

Check out 08-DecisionStructures from SVN

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Mail box number on your quiz

Q1

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Grading Status

- Everything through HW5 is graded
- See ANGEL for grades and comments

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Control Freaks

- Typical: statements execute in order
- Sometimes we want other orders
  - What examples have we seen of this?
- Statements that alter the flow are called *control structures*

Decision, Decisions

- *Decision structures* are control structures that allow programs to "choose" between different sequences of instructions

Simple Decisions

- The **if** statement
  - **if <condition>:**
    <body>
- Semantics: "if the condition is **True**, run the body, otherwise skip it"

- Simple conditions
  - **<expr> <relop> <expr>**
  - 6 * 7 >= 42

Math	Python
<	<
≤	<=
>	>
≥	>=

Math	Python
=	==
≠	!=

Q2

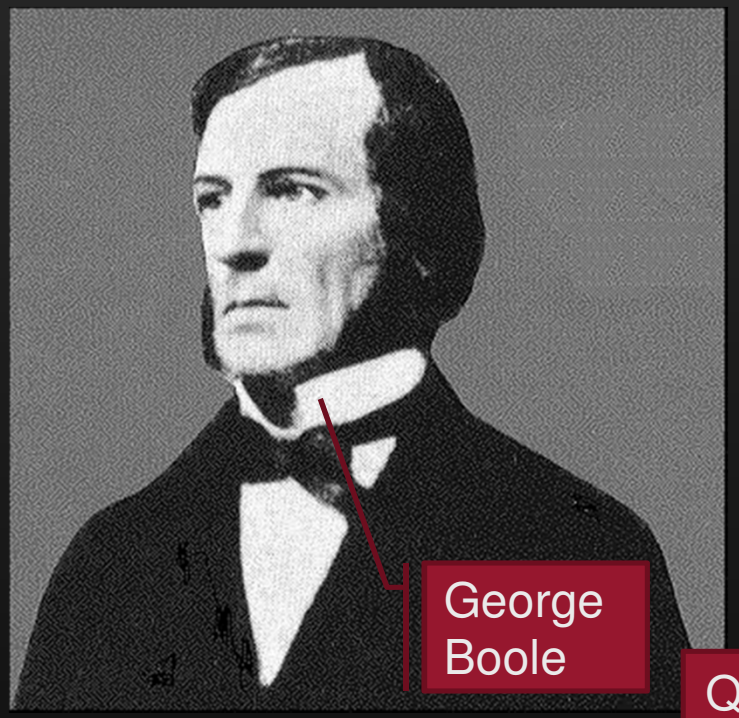
Exercise

- In module **grade.py**, define a function **grade(score)**
  - where score is from 0 to 100
  - and result is "perfect", "passing", or "failing" based on the score

More on Comparisons

- Conditions are Boolean expressions
  - Evaluate to **True** or **False**
- Try these:

```
>>> 3 < 4
>>> 42 > 7**2
>>> "ni" == "Ni"
>>> "A" < "B"
>>> "a" < "B"
```



Q3

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Boolean Operators

- and, or, not

P	Q	P and Q
T	T	T
T	F	F
F	T	F
F	F	F

P	Q	P or Q
T	T	T
T	F	T
F	T	T
F	F	F

P	not P
T	F
F	T

Q4

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Having It Both Ways: if-else

- Syntax:
  if <condition>:
  <statementsForTrue>
  else:
  <statementsForFalse>
- Semantics:
  "If the condition is true, execute the statements for true, otherwise execute the statements for false"

Q5

A Mess of Nests

- Can we modify the grade function to return letter grades—A, B, C, D, and F?

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Multi-way Decisions

- Syntax:

```
if <condition1>:
        <case 1 statements>
elif <condition2>:
        <case 2 statements>
elif <condition 3>:
        <case 3 statements>
...
else:
        <default statements>
```

Reach here if condition1 is false

Reach here if condition1 is false and condition2 is true

Reach here if both condition1 and condition2 are false

Cleaning the Bird Cage

- Advantages of **if-elif-else** vs. nesting
  - Number of cases is clear
  - Each parallel case is at same level in code
  - Less error-prone
- Implement **gradeFixed** to use **if-elif-else** statement instead of nesting

Q6

Wrap up the quiz before starting homework

Finish the quiz

Q7

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Complete the TODOs in countPassFail.py

Individual Exercise on Decisions

If you finish this, continue with rest of HW08

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