Introduction to (Simplified) Python

Venkatesh Choppella

International Institute of Information Technology, Hyderabad

Outline

What is a Python program?

Sequential Python

Examples

Types of instructions

Expressions, Statements and Blocks

More Examples

Other stuff (TAs will cover this)

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Locations

- Loc = [0 .. N]

Program

- Pgm = [0 .. N-1] -> Instr

- Location N has no instruction

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Instructions

- expression assignment
- pass

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Example

```
0
  a = 5
1
  x = a + 6
2
```

Here N=2, P_0 = "a=5" and P_1 = "x=a+6"

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Instructions

```
<instr> ::= <exp-assign> |
            pass         |    SEQUENTIAL
 ----------------------------------------
            if <exp>: |
            else      |       CONDITIONAL
 ----------------------------------------
            while <exp>: |
            break        |
            continue     |    ITERATIVE
 ----------------------------------------
            <def>          |
            <ret>          |
            <call-assign>     PROCEDURAL
----------------------------------------
```

Assignment and Function Definition

```
<exp-assign> ::= <var> = <exp>
-----------------------------------
<call-assign> ::= <var> = <fn-call>
<fn-call> ::= <var>(<exp> ...)
-----------------------------------
<def> ::= def <var>(<var> ...):
<ret> ::= return <exp>
-----------------------------------
```

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Expression Syntax

```
  <exp> ::= <var> | <const> | <prim> |
            <exp> <bop> <exp> | <uop> <exp>
----------------------------------------------------
  <bop> ::= + | - | * | / | // |           ARITHMETIC
           == | < | <= | > | >= | != |     RELATIONAL
     and | or                          LOGICAL
  <uop> ::= not | -
----------------------------------------------------
  <const> ::= <num> | <bool> | <str>      CONST
----------------------------------------------------
  <bool> ::= True | False
----------------------------------------------------
  <prim> ::= <primop>|(<exp> <exp> ...)
  <primop> ::= int | bool | print | input | len
```

Atomic Statements

```
<stmt> ::= <atomic-stmt> | <compound-stmt>

<atomic-stmt> ::= <exp-assign> |
                  <call-assign> | <ret> |
                  pass | continue | break
```

Compound Statements

```
<compound-stmt> ::= <if-stmt> | <while-stmt> | <def-stmt>

<if-stmt> ::= if <exp>:
                <block>
              else:
                <block>

<while-stmt> ::= while <exp>:
                   <block>
                   continue

<def-stmt> ::= <def>
                 <block>
                 <ret>
```

Blocks

```
<block> ::= <stmt>
            <stmt>
            ...

<pgm> ::= <block>
```

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Sequential

Conditional

Iterative

Procedural

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Input

- How to read from user input

Print

- How to print values to the output

Import

- Importing modules

Command Line arguments

- How to retrieve command line arguments