

1. Study *Computer Systems*, Sixth edition Chapter 7, Sections 7.4, 7.5.
2. The Python software package for this course has been revised. Archive your old version and download and install the new version for the remaining assignments.
3. The grammar below modifies the Pep/10 grammar to make addressing modes optional for dyadic instructions. Only instructions with an addressing-a field, which are the branch and call instructions, may omit addressing modes. When omitted, the instruction uses immediate addressing by default. All other dyadic instructions specify an addressing mode and raise a syntax error if no addressing mode is present.

$N = \{ \langle \text{argument} \rangle, \langle \text{instruction} \rangle, \langle \text{line} \rangle, \langle \text{statement} \rangle \}$
 $T = \{ \text{HEX, DEC, COMMA, EMPTY, IDENT, SYMBOL} \}$
 $P =$ the productions

1. $\langle \text{argument} \rangle \rightarrow \text{HEX} \mid \text{DEC} \mid \text{IDENT}$
2. $\langle \text{instruction} \rangle \rightarrow \text{IDENT} \langle \text{argument} \rangle [\text{COMMA IDENT}]$
3. $\langle \text{line} \rangle \rightarrow \langle \text{instruction} \rangle [\text{COMMENT}]$
4. $\langle \text{statement} \rangle \rightarrow [\text{COMMENT} \mid ([\text{SYMBOL}] \langle \text{line} \rangle)] \text{EMPTY}$

 $S = \langle \text{statement} \rangle$

Modify the $\langle \text{instruction} \rangle$ rule of the parser in `pep10/parser.py`. Add the following import to the top of the file.

```
from .mnemonics import DEFAULT_ADDRESSING_MODES
```

You can access the default value for the addressing mode with the dictionary look

```
\begin{verbatim}
DEFAULT_ADDRESSING_MODES[<upper_case_string>]
```

To test your program enter, for example, the following in the PyCharm terminal:

```
uv run main parser --text "BR 0"
```

which should produce the following intermediate representation output:

```
DyadicLine('BR 0,i')
```

IMPORTANT: The process for submitting Python assignments has changed. Do not hand in the entire PyCharm project as a zip file. Instead, submit individual `.py` files. For this assignment, submit only `pep10/parser.py`.

- (1) After you have tested your program, quit PyCharm.
- (2) Locate `pep10/parser.py` with the file system on your computer.
- (3) Duplicate the file, and remove it from the PyCharm project directory.
- (4) Prepend the duplicated file name with your two-digit number.

For example, if your two-digit number is 99 you would name it `99parser.py`.