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1 What is PytuX?

PytuX is the DSL-wrapper of another programming language Ren'Py for writing visual novels. The main purpose of PytuX DSL is to be macro preprocessor which can divide .rpy file into modules. Also PytuX have some state-of-art macro commands for creating quizzes, so it can be used in education. We created PytuX to solve software complexity problem of Ren'Py.

2 Language description

2.1 Alphabet

$$A = [A - Za - z\_0 - 9 = + - \backslash n \backslash' \backslash < \backslash >]$$

2.2 Lexemes

$$L = \{identifier,\ equals,\ string,\ newline,\ tag,\ marker,\ include,\ quiz,\ end,\ to, ;\ score\}$$

где:

- $identifier$: $[a-zA-Z\_][a-zA-Z\_0-9]$ – some identifier, e.g. variable name or reserved word;
- $equals$:= – used in assigning value to variable;
- $string$: $\backslash'(.+?)\backslash'$ – just string, you know;
- $newline$: $\backslash n+$ – group of newline symbols;
- tag : $\backslash < rpy \backslash > [\backslash S \backslash s]*?\backslash < /rpy \backslash >$ – tag for Ren'Py insertion in PytuX source code, everything inbetween this two lexemes will be placed in translation result without changes;
- $marker$: $[+-]$ – marker of correct/incorrect answer in quiz;
- $include$ – include (!), this is our main and most powerful macro;
- $quiz$ – lexeme for quiz generation, followed by list of answers;
- end – end of quiz;
- to – this lexeme is used to relate quiz to some test, so to score points;
- $score$ – output score points;

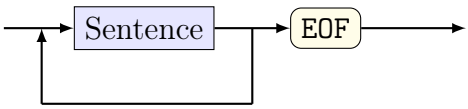
2.3 Syntax

Legend:

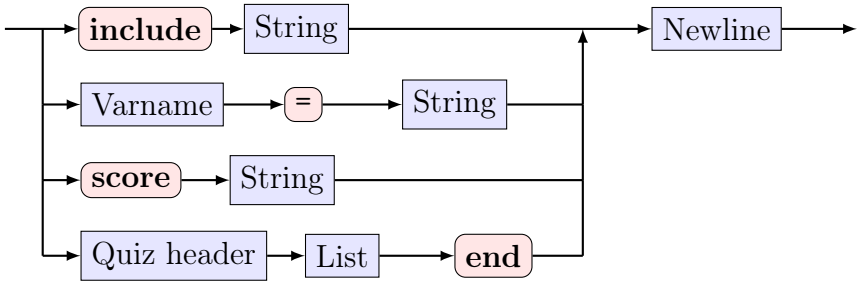
`···` – terminal

`···` – nonterminal

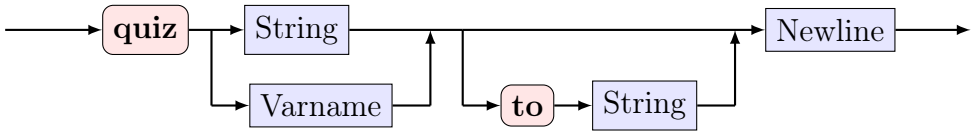
`EOF` – end of file



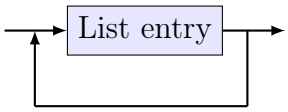
Program



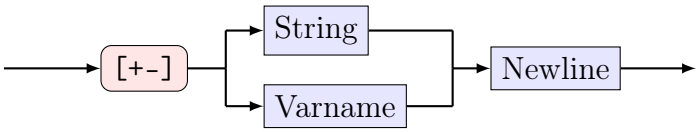
Sentence



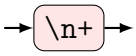
Quiz header



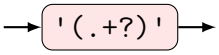
List



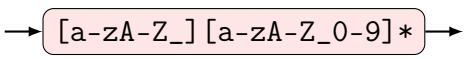
List entry



Newline



String



Varname

3 Examples

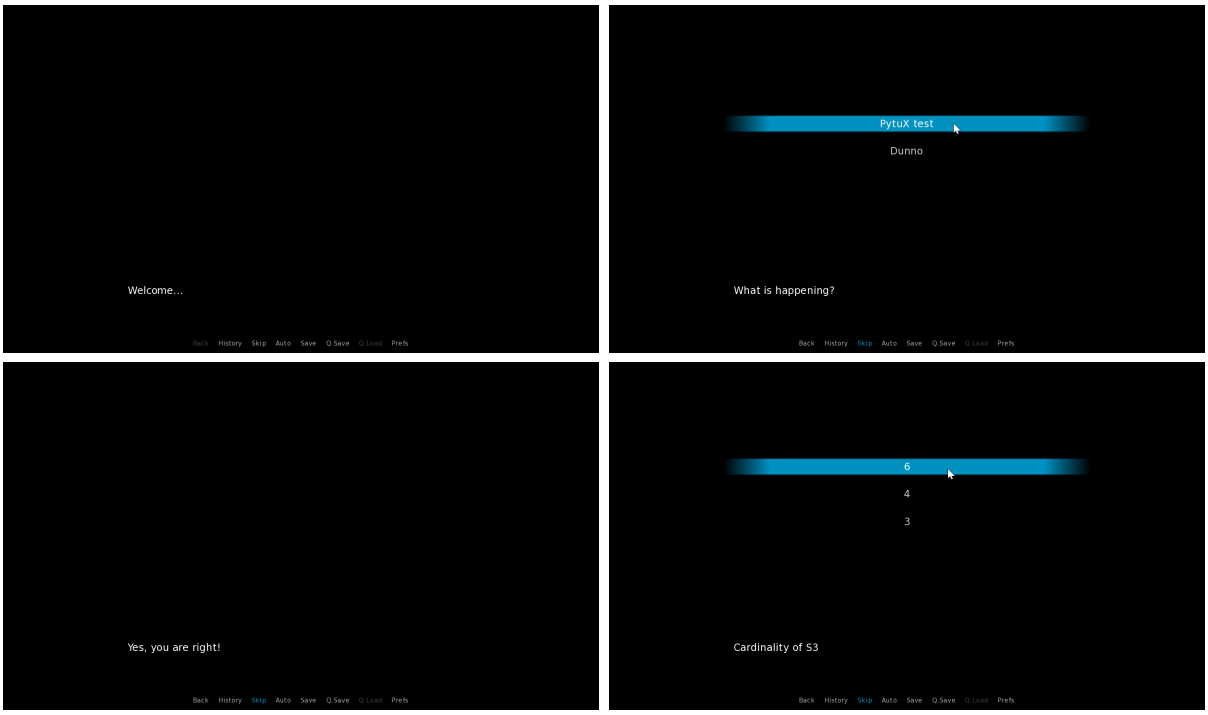
3.1 Quiz generation with include

PytuX souce code to the left: script.ptx – main file, question.ptx – auxiliary file; Ren'Py code to the right;

```
###### script.ptx ######

<rpy>"Welcome..."</rpy>

include 'question.ptx'

quiz 'Cardinality of S3'
+ '6'
- '3'
- '4'
end

<rpy>"Thanks!"</rpy>



###### question.ptx #####

quiz 'What is happening?'
+ 'PytuX test'
- 'Dunno'
end
```

```
########## script.rpy ##########

label start:
"Welcome..."
menu quiz_1:
    "What is happening?"

    "Dunno":
        "Nope, wrong answer..."
    "PytuX test":
        "Yes, you are right!"

menu quiz_2:
    "Cardinality of S3"

    "6":
        "Yes, you are right!"
    "4":
        "Nope, wrong answer..."
    "3":
        "Nope, wrong answer..."
"Thanks!"
```

In game:



launch of script.rpy

3.2 Possible syntax errors

Syntax error example 1: no newline before EOF

```
# No newline at end of file
smth = 'fail'<EOF>
```

```
ERROR: Syntax error: Unexpected end of file
```

Syntax error example 2: newline right after `score` (expected String with test name):

```
# Newline right after score
score
```

```
ERROR: Syntax error: Unexpected line break on line 2
```

Syntax error example 3: trying to assign value to reserved word `end`:

```
# An attempt to create variable with reserved name 'end'
end = 'smth'
```

```
ERROR: Syntax error: Unexpected token (END, end) on line 2
```

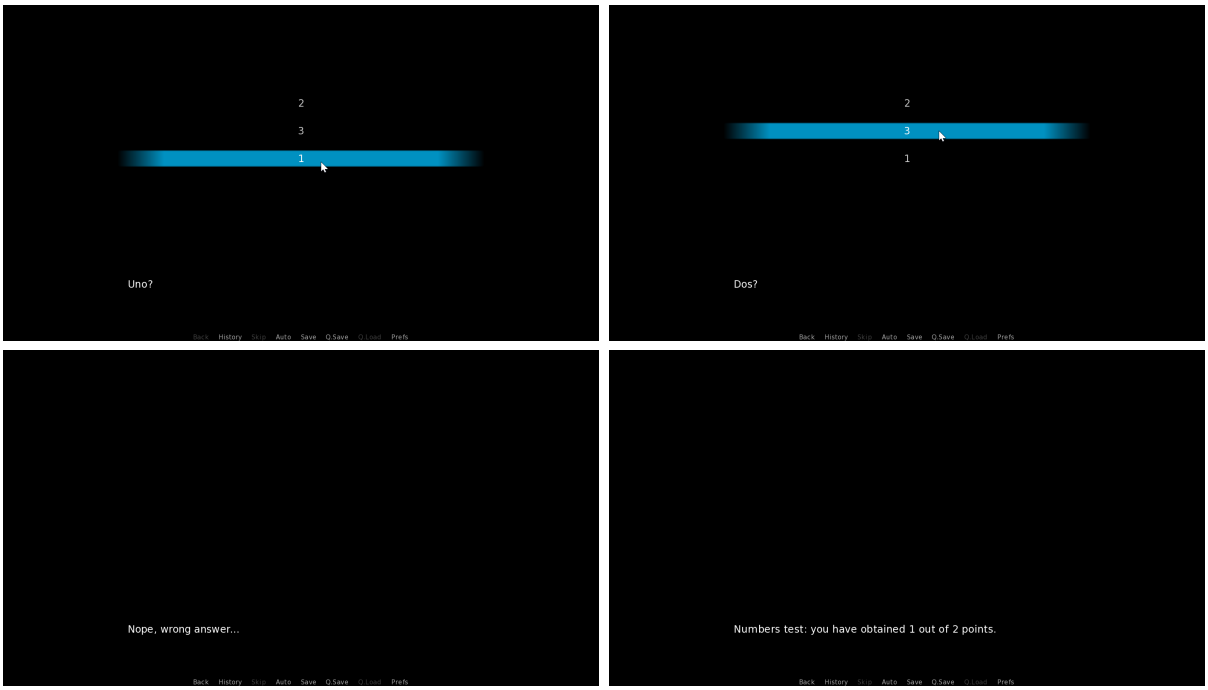
3.3 Test generation

PytuX souce code to the left: script.ptx – main file, question.ptx – auxiliary file; Ren'Py code to the right;

```
###### test.ptx #######
quiz 'Uno?' to 'Numbers'
+ '1'
- '2'
- '3'
end

quiz 'Dos?' to 'Numbers'
+ '2'
- '1'
- '3'
end

score 'Numbers'
```

```
########### test.rpy ###########
label start:
$ score_1 = 0
menu quiz_1:
  "Uno?"

  "2":
    "Nope, wrong answer..."
  "3":
    "Nope, wrong answer..."
  "1":
    $ score_1 += 1
    "Yes, you are right!"

menu quiz_2:
  "Dos?"

  "2":
    $ score_1 += 1
    "Yes, you are right!"
  "3":
    "Nope, wrong answer..."
  "1":
    "Nope, wrong answer..."

"Numbers test: you have obtained
[score_1] out of 2 points."
```

In game:



launch of test.rpy