Advances in PythonTEX with an

Geoffrey Poore

Union University
Jackson, TN

Advances in PythonTeX ↪ with an introduction ↪ to fvextra

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Background

PythonTeX (2011)

```
\usepackage{pythontex}
...
\begin{pycode}
print("Hello from Python!")
\end{pycode}
```

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pdflatex document.tex
pythontex document.tex
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Hello from Python!

Background

PythonTEX (2011)

```
\begin{pyblock}
x = 2**8
print("Hello from Python!")
\end{pyblock}

\printpythontex  The variable $x = \py{x}$.
```

Background

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\begin{pyblock}
x = 2**8
print("Hello from Python!")
\end{pyblock}

\printpythontex  The variable $x = \py{x}$.
```

```
x = 2**8
print("Hello from Python!")
```

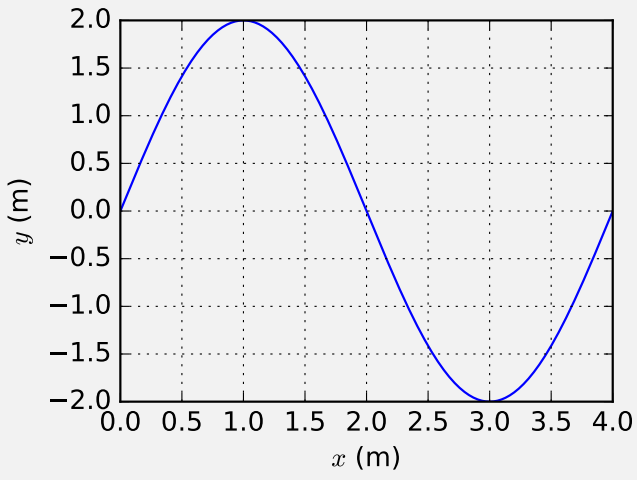
Hello from Python! The variable $x = 256$.

Background

PythonTEX (2011)

```
\begin{pycode}
from pylab import *
figure(figsize=(4,3))
x = linspace(0, 4, 1001)
plot(x, 2*sin(2*pi*x/4))
xlabel('$x$ (m)')
ylabel('$y$ (m)')
grid(True)
savefig('wave.pdf', bbox_inches='tight')
\end{pycode}

\includegraphics[scale=0.4]{wave}
```



Background

PythonTeX (2011)

Also options to typeset code with no execution (Pygments syntax highlighting)

- `pyverbatim` environment and `\pyv` command
- `pygments` environment and `\pygment` command that follow `minted` syntax

Background

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Also options to typeset code with no execution (Pygments syntax highlighting)

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- `pygments` environment and `\pygment` command that follow `minted` syntax

Support for executing other languages

- Ruby, Julia, Octave, Sage, Bash, Rust, ...

Verbatim for code

`fancyvrb`

Timothy Van Zandt, Herbert Voß, Denis Girou, Sebastian Rahtz, Niall Mansfield

v2.0 Beta	1994/03/30	First version personally shown by Timothy van Zandt
v2.5	1998/01/28	First public release.
v2.6	1998/07/17	Three bug corrected, options numberblanklines, label, labelposition and leftline added and few precisions.
v2.7	2000/03/21	DG/SR changed how fancyvrb.cfg included
v2.7a	2008/02/07	NMM fixed lastline=firstline bug
v2.8	2010/05/15	fixed bug with several trailing spaces (hv)

Used in `minted`, `pythontex`, `listings` (optionally), ...

Verbatim for code

`fvextra`

v1.0 2016/06/28 initial release

- Extends and patches `fancyvrb`
- New features fully supported in `pythontex` and also `minted`
- Most features will work in other packages with no modification

fvextra

Quotation marks — upquote by default

```
\begin{Verbatim}
`Single quoted text'  ``Double quoted text''
\end{Verbatim}
```

```
`Single quoted text'  ``Double quoted text''
```

```
\begin{Verbatim}[curlyquotes]
`Single quoted text'  ``Double quoted text''
\end{Verbatim}
```

```
‘Single quoted text’  "Double quoted text"
```

fvextra

Math in verbatim — closer to normal math mode

```
\begin{Verbatim}[commandchars=\\\{\}, mathescape]
$x^2 + \frac{d}{dx} f_\text{sub}(x) = g(x)$
\end{Verbatim}
```

`fancyvrb:` $x^2 + \frac{d}{dx} f_{\text{sub}}(x) = g(x)$

`fvextra:` $x^2 + \frac{d}{dx} f_{\text{sub}}(x) = g(x)$

fvextra

Revenge against the tabs

```
\fvset{obeytabs, showtabs,
       tab=\rightarrowfill, tabcolor=blue}
\begin{pyverbatim}
some_string = '''
    ↦First line
    ↦Second line
    ↦'''
\end{pyverbatim}
```

```
some_string = '''
⟶   First line
⟶   Second line
⟶   '''
```

fvextra

highlightlines

```
[highlightlines={2, 4-6}, highlightcolor=yellow, ... ]
```

```
1  \ifnum\catcode`\{=1
2    \errmessage
3    {LaTeX must be made using an initex with no format preloaded}
4  \fi
5  \catcode`\{=1
6  \catcode`\}=2
7  \ifx\directlua\undefined
8  \else
9    \ifx\luatexversion\undefined
10     \directlua{tex.enableprimitives("",%
11                tex.extraprimitives('etex', 'pdftex', 'umath'))}
12     \directlua{tex.enableprimitives("",%
13                tex.extraprimitives("omega", "aleph", "luatex"))}
14   \fi
15 \fi
```

Selection from `latex.ltx`

fvextra

breaklines

`[breaklines=false]` (default)

```
\ifx\directlua\undefined
\else
  \ifx\luatexversion\undefined
    \directlua{tex.enableprimitives("",%
                  tex.extraprimitives('etex', 'pdftex',
    \directlua{tex.enableprimitives("",%
                  tex.extraprimitives("omega", "aleph",
  \fi
\fi
```

fvextra

breaklines

```
[breaklines=true]
```

```
\ifx\directlua\undefined
\else
  \ifx\luatexversion\undefined
    \directlua{tex.enableprimitives("",%
                  tex.extraprimitives('etex',
                  ↪ 'pdftex', 'umath'))}
    \directlua{tex.enableprimitives("",%
                  tex.extraprimitives("omega",
                  ↪ "aleph", "luatex"))}
  \fi
\fi
```

fvextra

breaklines

```
\newcommand{\breaksym}{%
  \raisebox{-1ex}{%
    \rotatebox{30}{\reflectbox{\ding{43}}}}}

\begin{Verbatim}[breaklines,
                 breaksymbolleft=\ding{43},
                 breaksymbolright=\breaksym]
A very long line of text that just went right off th
\end{Verbatim}
```

```
A very long line of text that just went     ☞
 ☞ right off the side of the slide
```

fvextra

breakbefore and breakafter

```
\begin{Verbatim}[breaklines,
                 breakbefore=C, breakafter=T]
TATACCATGTGATTCATTTTACTTGATTTAACAAATAAAAATATAAATACAT
\end{Verbatim}
```

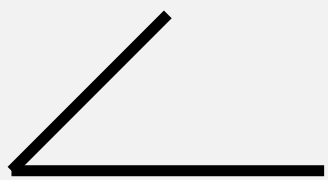
```
TATACCATGTGATTCATTTTACTTGATTTAACAAATAAAAAT⌋
↪ ATAAATACATTGTAATTCATTTTTGGTAAACCATTTCA⌋
↪ CAAAAGTGTGGGGAAATTAATTTGGGAATTACTCTCCT⌋
↪ CATTGAAAAATATCTCATTTGCTAAAATAAGACAGT⌋
↪ AAAACAGTACAGTTTAAATATTTATAAAAAT⌋
↪ AGGAAAGTTTGGCAAAAAGAGAGGAGTACACACCTGTGA
```

breaks are catcode-independent and by default group identical characters!

PythonTEX

`sub` environment, or how to avoid catcodes and other trickery

```
\begin{tikzpicture}
\draw (0, 0) -- (2, 0);
\draw (0, 0) -- (1, 1);
\end{tikzpicture}
```



PythonTeX

`sub` environment, or how to avoid catcodes and other trickery

```
\begin{pycode}
from math import *
p = sqrt(2)
\end{pycode}

\begin{tikzpicture}
\draw (0, 0) -- (2, 0);
\draw (0, 0) -- (\py{p}, \py{p});
\end{tikzpicture}
```

PythonTeX

`sub` environment, or how to avoid catcodes and other trickery

```
! Missing \endcsname inserted.
<to be read again>
                   \xdef
1.472 \draw (0, 0) -- (\py{p}, \py{p})
                                       ;
The control sequence marked <to be read again> should
not appear between \csname and \endcsname.
```

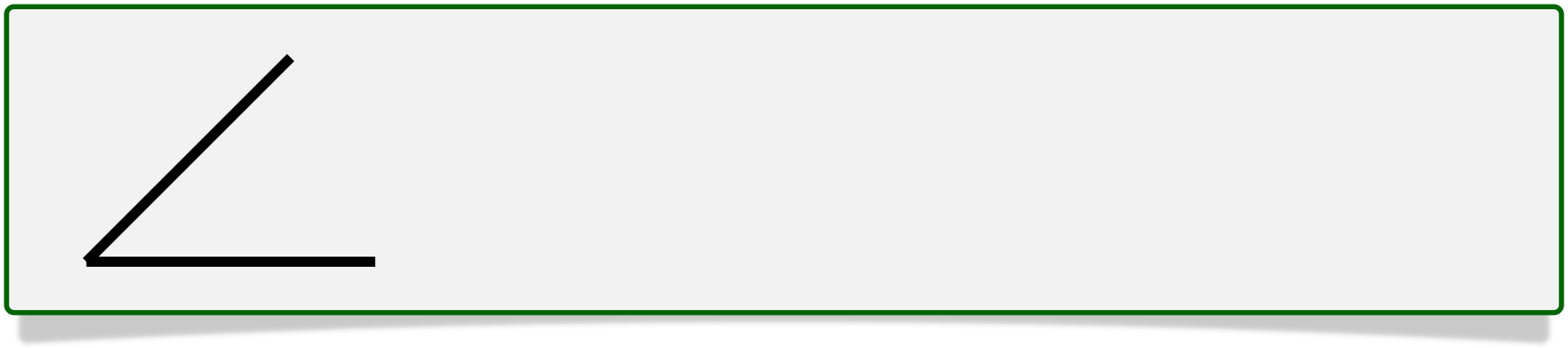
PythonTeX

`sub` environment, or how to avoid catcodes and other trickery

```
\begin{pycode}
from math import *
p = sqrt(2)
template = '''
    \\begin{{tikzpicture}}
    \\draw (0, 0) -- (2, 0);
    \\draw (0, 0) -- ({p}, {p});
    \\end{{tikzpicture}}
    '''
print(template.format(p=p))
\end{pycode}
```

PythonTEX

`sub` environment, or how to avoid catcodes and other trickery



PythonTeX

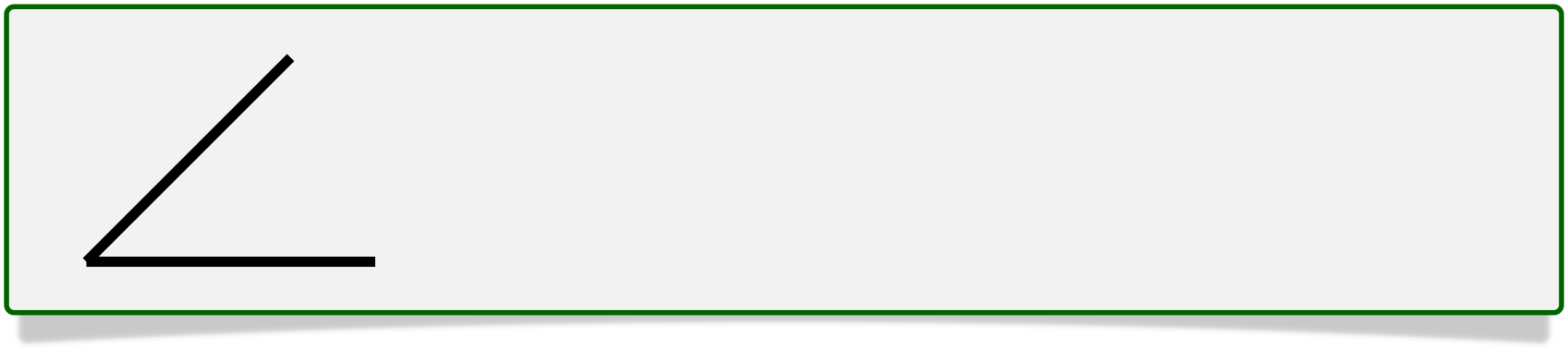
`sub` environment, or how to avoid catcodes and other trickery

```
\begin{pycode}
from math import *
p = sqrt(2)
\end{pycode}

\begin{pysub}
\begin{tikzpicture}
\draw (0, 0) -- (2, 0);
\draw (0, 0) -- (!{p}, !{p});
\end{tikzpicture}
\end{pysub}
```

PythonTEX

`sub` environment, or how to avoid catcodes and other trickery



PythonTeX

`sub` command, or how to avoid catcodes and other trickery

```
\begin{pycode}
x = 2**16
\end{pycode}

\pys{\verb|x = !{x}|}
```

```
x = 65536
```

PythonTEX

Simpler support for additional languages coming “soon”

Currently, edit Python code and create classes

```
bash_template = '''
    cd "{workingdir}"
    {body}
    echo "{dependencies_delim}"
    echo "{created_delim}"
    '''

bash_wrapper = '''
    echo "{stdoutdelim}"
    >&2 echo "{stderrdelim}"
    {code}
    '''

bash_sub = '''echo "{field_delim}"\necho {field}\n'''

CodeEngine('bash', 'bash', '.sh',
           '{bash} "{file}.sh"',
           bash_template, bash_wrapper, '{code}', bash_sub,
           ['error', 'Error'], ['warning', 'Warning'],
           'line {number}')
```

Soon, just drop a config file in `pythontex/languages`

PythonTEX

Limited support for interactive programs coming “soon”

Requirements

- Communicate via pipes
- Predictable encoding

Don’t typeset code without `fvextra`!