
NINA ZAKHARENKO

GOODBYE PRINT. HELLO DEBUGGER



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WHAT YOU'LL LEARN TODAY

- ▶ why use debuggers?
- ▶ breakpoints, other debugger fundamentals
- ▶ my workflow
- ▶ tools: pdb, ipdb, IDEs
- ▶ breakpoint() in Python 3.7
- ▶ demos, tips & tricks, when to use what



(THIS IS MY WAY)
NOT ONE 'RIGHT' WAY



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DEMO APPLICATION



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CALL API & GET JSON

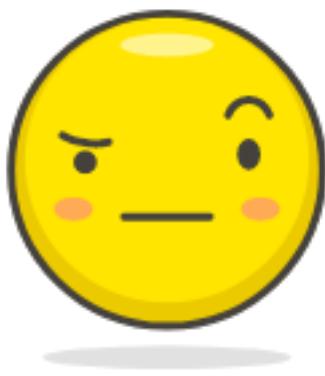
```
def repos_with_most_stars(languages, min_stars, sort, order):
    query = create_query(languages, min_stars)
    parameters = {"q": query, "sort": sort, "order": order}

    response = session.get(github_api_url, params=parameters)

    if response.status_code != 200:
        raise GitHubApiException(response.status_code)

    response_json = response.json()
    items = response_json["items"]
```

PRINT

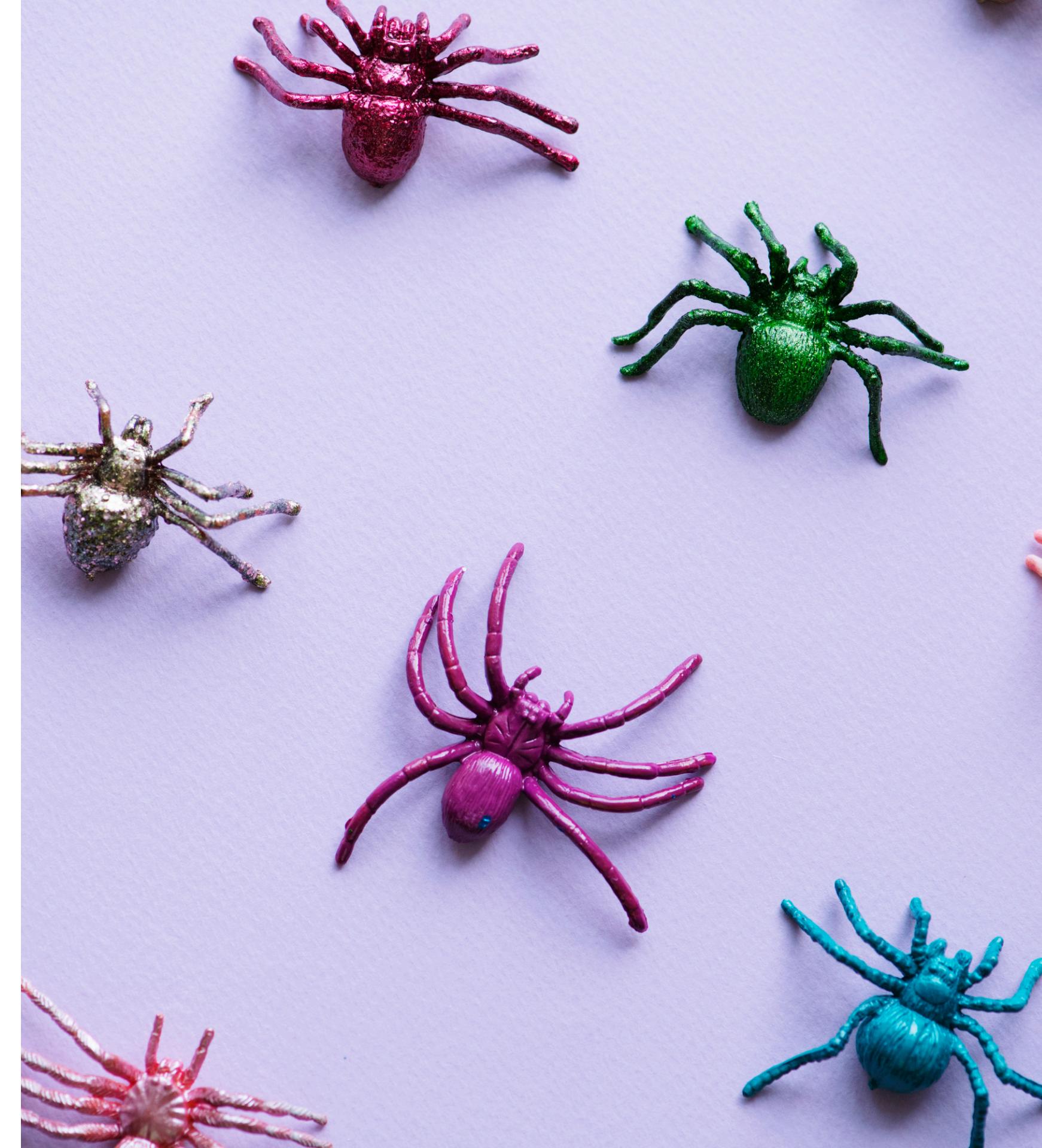


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WHY USE DEBUGGERS?



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DEBUGGING



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A DEBUGGER HELPS YOU
EXAMINE THE STATE
OF A RUNNING PROGRAM

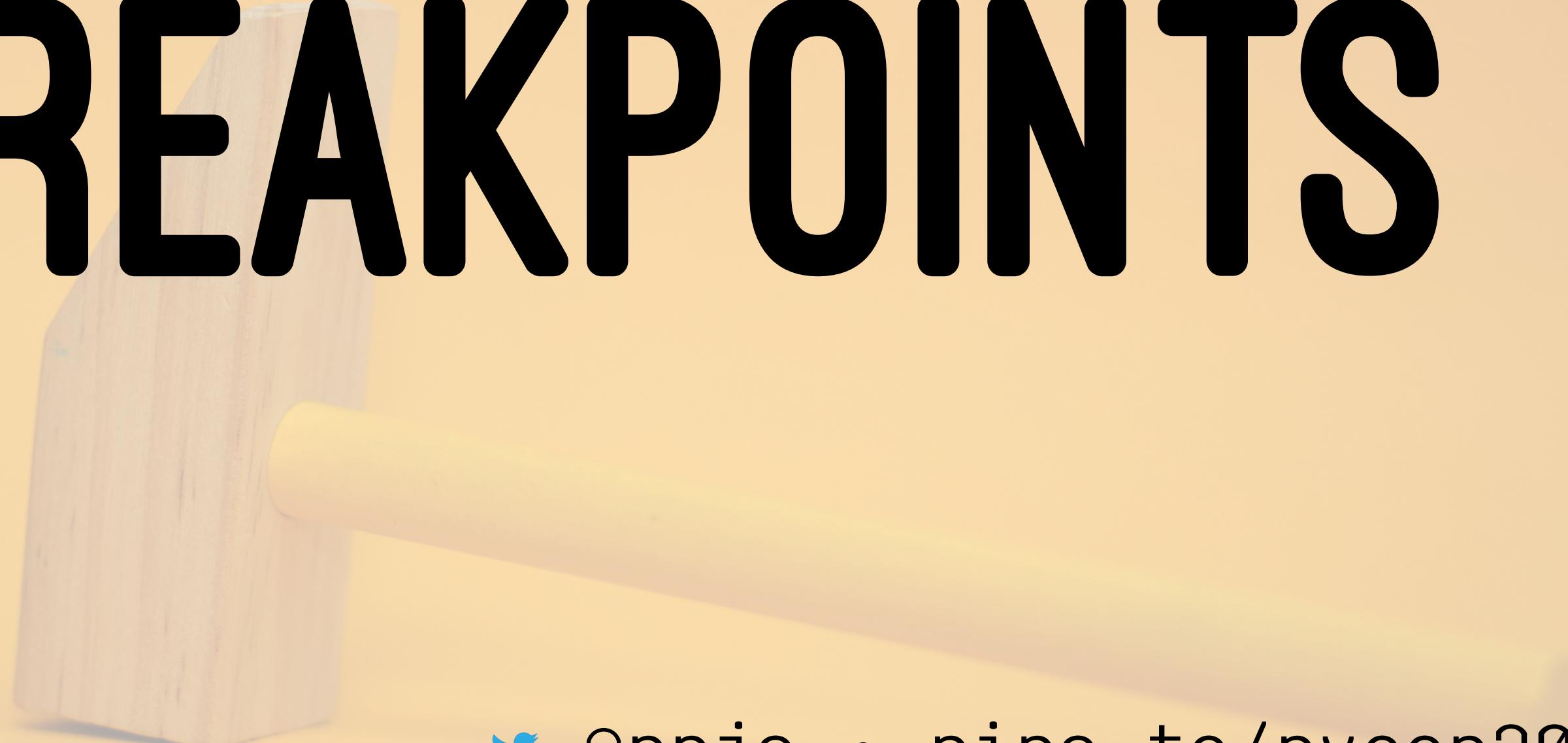


DEBUGGER FUNDAMENTALS



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BREAKPOINTS



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**PYTHON 3.7?
USE `breakpoint()`**



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breakpoint() ADVANTAGES

- ▶ set your debugger of choice
(I like ipdb)
- ▶ export PYTHONBREAKPOINT=ipdb.set_trace
(only in Python >= 3.7)



breakpoint() ADVANTAGES

environment variable that
allows you skip all debug
breakpoints

```
$ PYTHONBREAKPOINT=0 python3.7 prod_code.py
```

(only in Python >= 3.7)



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CLI BREAKPOINTS IN PYTHON < 3.7

- ▶ #1 Add them directly to your code

```
import pdb; pdb.set_trace()  
# or  
import ipdb; ipdb.set_trace()
```

- ▶ #2: Set them interactively

```
$ python -m pdb hello.py  
(Pdb) break 7  
Breakpoint 1 at hello.py:7
```



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5 MOST IMPORTANT COMMANDS

- ▶ l(ist) or ll for long list
- ▶ n(ext) - next line
- ▶ s(tep) - into
- ▶ c(ontinue) - until next breakpoint
- ▶ h(elp) <optional command>



Python 3.7

breakpoint()	Start debugger inside a Python script
PYTHONBREAKPOINT=0	Env Var: Set to skip all breakpoints
PYTHONBREAKPOINT=ipdb.set_trace	Env Var: breakpoint() which debugger to use

Getting Started

import pdb; pdb.set_trace()	Start pdb inside a python script
python -m pdb <file.py>	Start pdb from the command line
import ipdb; ipdb.set_trace()	Start ipdb inside a python script

Help or Exit

h(elp)	show help
q(uit) or ctrl+d	quit debugging

Manual Breakpoints

b(reak)	show all breakpoints
b(reak) line_no	set a breakpoint at a line
b(reak) line_no, condition	set a breakpoint at a line, if condition is met

Stepping

n(next)	step over
s(tep)	step into
r(eturn)	continue until current function returns
c(ontinue)	continue until next breakpoint
j(ump) line_no	next line to be executed (useful for breaking out of loops)

Frame Navigation

u(p)	up one level in the stack trace
d(own)	down one level in the stack trace

Display

pint(expr)	print the value of expr
pp expr	pretty print the value of expr
w(here)	print the current position and stack trace
l(ist)	print the lines of code around the current line
a(rgs)	print args of the current function

credits

original sheet from: github.com/Kapeli/cheatsheets



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TYPES OF DEBUGGERS



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COMMAND LINE DEBUGGERS

- ▶ `pdb` (in standard library)
- ▶ ▶ `ipdb`- `ipdb` (via pip install `ipdb`)
- ▶ & more . . .





COMMAND LINE DEBUGGING



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GRAPHICAL DEBUGGERS

- ▶ pudb (graphical CLI)
- ▶ IDEs
- ▶ ▶ Visual Studio Code
- ▶ PyCharm
- ▶ & others . . .

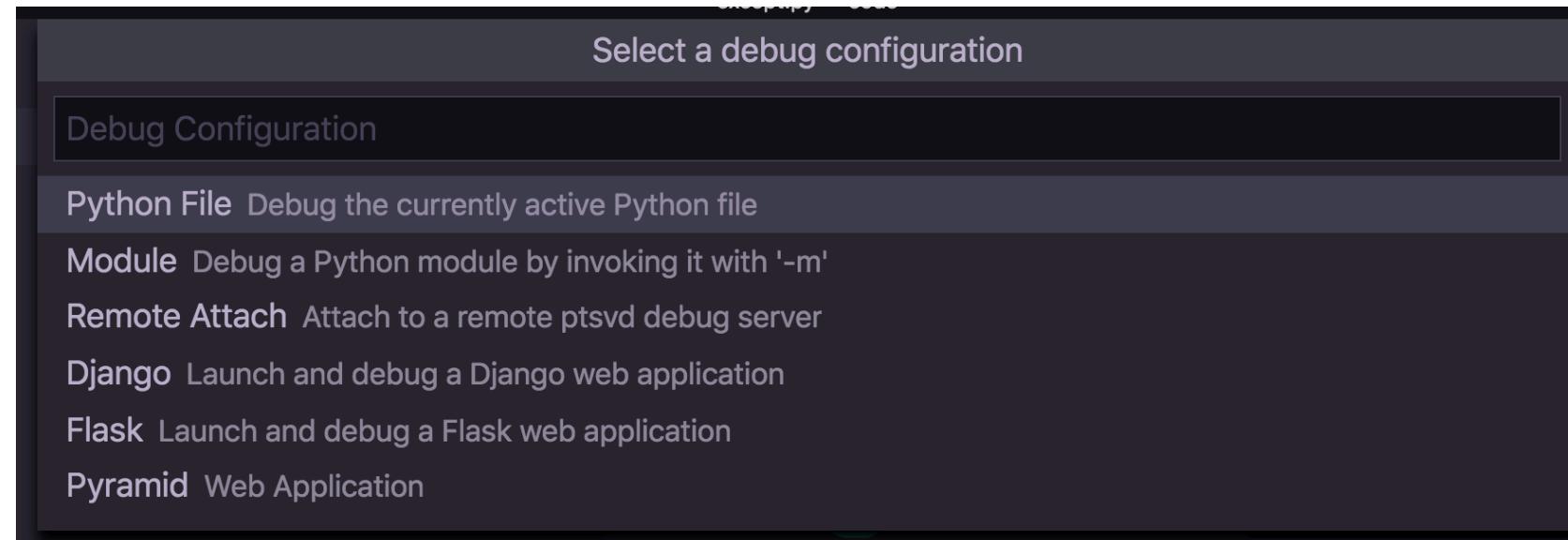


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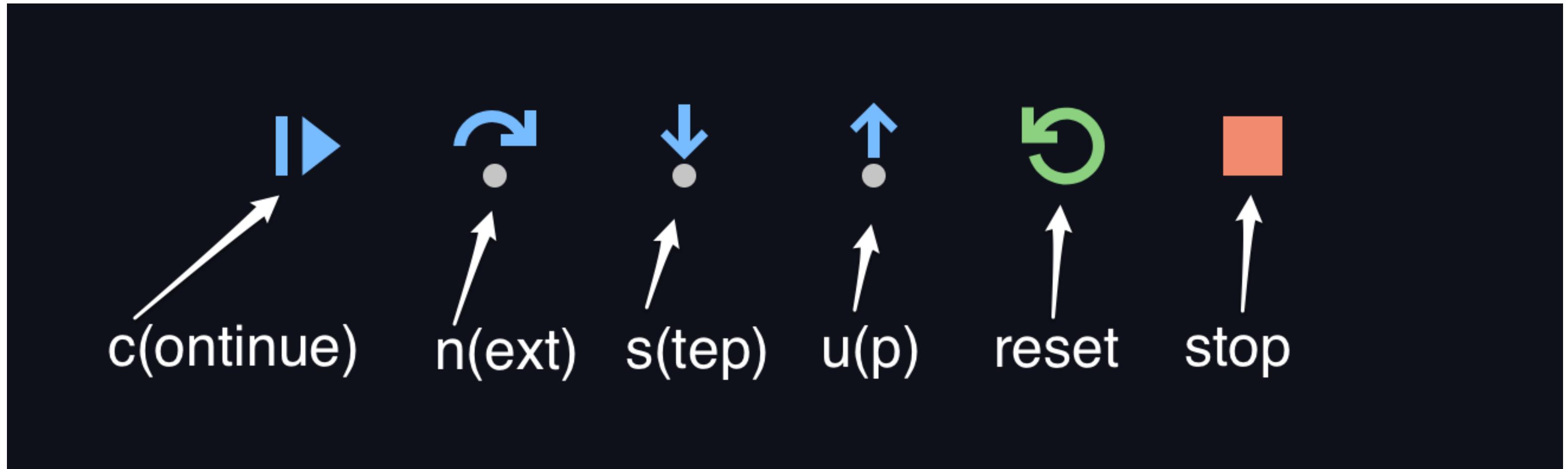
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PYTHON EXTENSION FOR VS CODE

- ▶ 1. Download VS Code
- ▶ 2. Install Python Extension
- ▶ 3. Create a Debugger Configuration



VISUAL BREAKPOINTS



DEBUGGING WITH AN IDE



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WHEN TO USE WHAT?



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WHEN TO USE WHAT?

CLI DEBUGGING

- ▶ small programs and scripts
- ▶ want to work from command line

IDE DEBUGGING

- ▶ complex code **or** large codebase
- ▶ debug templates



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TIPS & TRICKS



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TRICK: IPYTHON INTERACTIVE MODE ALIAS IN .PDBRC

```
import IPython
from traitlets.config import get_config

cfg = get_config()

# enable syntax highlighting
cfg.InteractiveShellEmbed.colors = "Linux"
cfg.InteractiveShellEmbed.confirm_exit = False

alias interacti IPython.embed(config=cfg)
```

download here: nina.to/pdbrc



DEBUGGING JUPYTER NOTEBOOKS

IN VS CODE

Debug Jupyter



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GOTCHAS



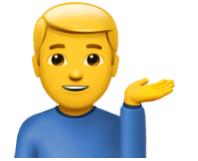
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DON'T LEAVE BREAKPOINTS IN PRODUCTION CODE!



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TIP: USE

git pre-commit HOOKS

pre-commit

A framework for managing and maintaining multi-language pre-commit hooks.

 Azure Pipelines succeeded coverage 100%

- ▶ Prevent commits that match conditions
- ▶ I use pre-commit.com
 - ▶ includes debug-statements hook
 - ▶ checks for:
pdb , ipdb , pudb ,
breakpoint() & more



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WRAPPING UP



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**FIXING BUGS IS A PROCESS OF CONFIRMING,
ONE BY ONE.
THAT THE THINGS YOU BELIEVE TO BE TRUE
ABOUT THE CODE **ARE TRUE.****

**WHEN YOU FIND AN ASSUMPTION THAT ISN'T.
YOU FOUND **A CLUE.****



(Paraphrased from the art of debugging with GBS, DDD, and Eclipse)



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THANKS!



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ADDITIONAL RESOURCES

- ▶ Interactive [pdb Tutorial](#) (also in Korean)
- ▶ [Python 3.7's new builtin breakpoint – a quick tour](#)



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