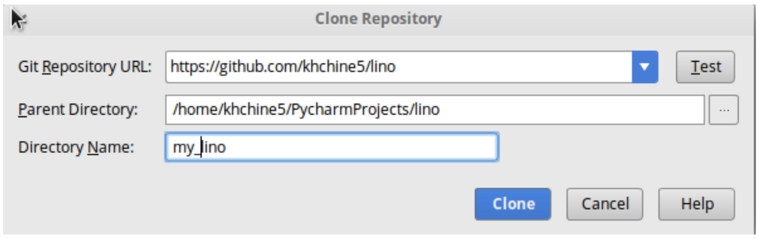
Discovering Lino using your debugger

by Hamza Khchine

In my daily work, I use PyCharm as my favorite IDE. It is very efficient when debugging Python code and has many useful features. Let’s see how I use it to debug the Lino base code to fix issues or add new code.
The next steps assume that you have PyCharm installed in your machine.

1) Creating a new PyCharm project
The Lino code base lives in its official repository on GitHub. First of all, you need to fork the Lino project to your GitHub account to be able to commit your change. This is done on the GitHub website.
Once this is done, you need to clone the code from your new repository and then install it within your virtual python environment.



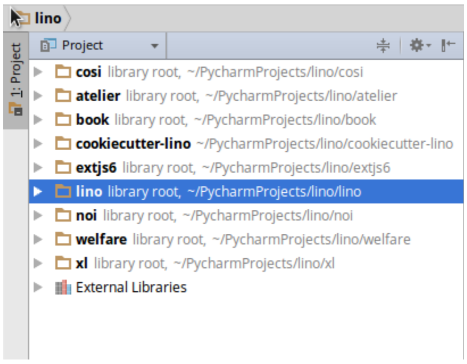
Clone Repository

Git Repository URL: https://github.com/khchine5/lino

Parent Directory: /home/khchine5/PycharmProjects/lino

Directory Name: my_lino

-Git Repository URL : the URL of your project.
-Parent Directory : Where your project will be copied in your machine.
After this, the project will be opened in PyCharm projects section

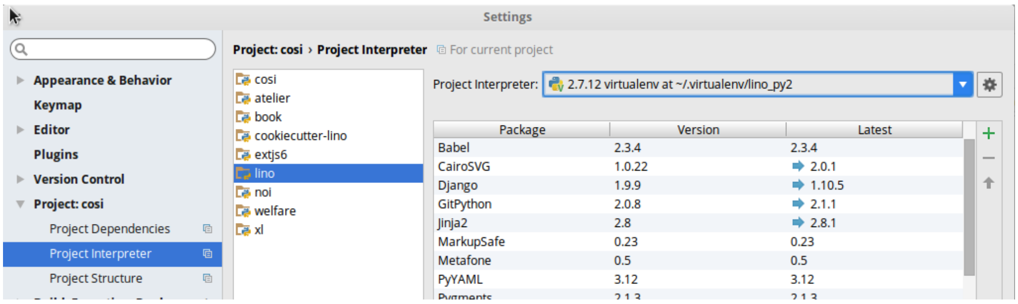


lino

Project

- cosi library root, ~/PycharmProjects/lino/cosi
- atelier library root, ~/PycharmProjects/lino/atelier
- book library root, ~/PycharmProjects/lino/book
- cookiecutter-lino ~/PycharmProjects/lino/cookiecutter-lino
- extjs6 library root, ~/PycharmProjects/lino/extjs6
- lino library root, ~/PycharmProjects/lino/lino
- noi library root, ~/PycharmProjects/lino/noi
- welfare library root, ~/PycharmProjects/lino/welfare
- xl library root, ~/PycharmProjects/lino/xl
- External Libraries

2) Add your virtual python environment to PyCharm
Open your PyCharm setting and search for project interpreter



Settings

Project: cosi › Project Interpreter

Project Interpreter: 2.7.12 virtualenv at ~/.virtualenv/lino_py2

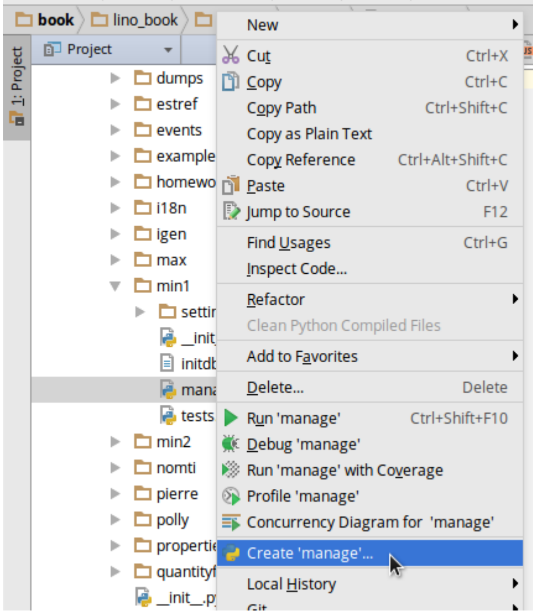
Package	Version	Latest
Babel	2.3.4	2.3.4
CairoSVG	1.0.22	➡ 2.0.1
Django	1.9.9	➡ 1.10.5
GitPython	2.0.8	➡ 2.1.1
Jinja2	2.8	➡ 2.8.1
MarkupSafe	0.23	0.23
Metafone	0.5	0.5
PyYAML	3.12	3.12
Pygments	2.1.3	2.1.3

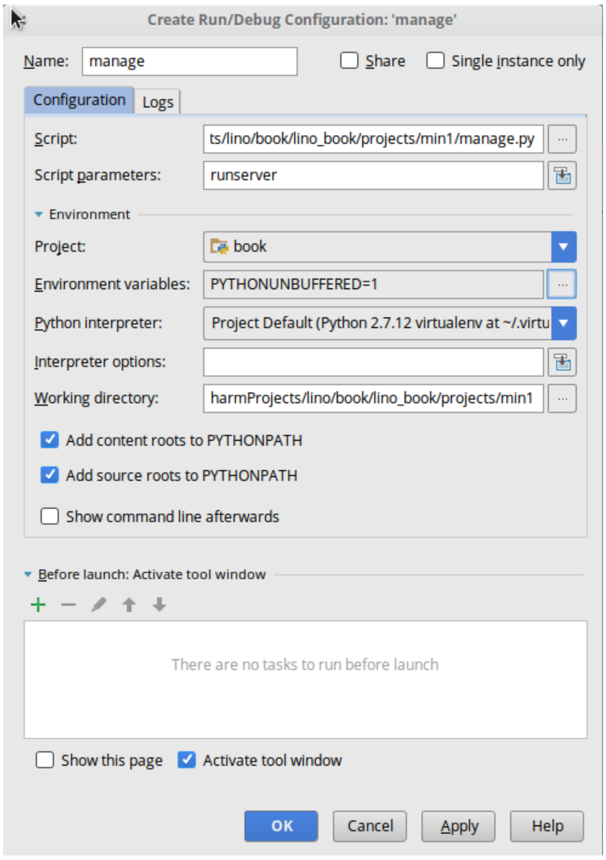
3) Creating your Run/debug configurations

At this step, we will try to run a Lino project under PyCharm. Thus, we need to clone and fetch (Step 1 and 2) the book project. I picked this project because it contains several demo projects. You need also to install it within your virtual python environment.

Once the book project is ready, we choose the ‘min1’ project as a sample.

We create the a run configuration, by right clicking the file in the project menu selecting the 'create “manage”…' option and filling out the configuration with a run parameter of 'runserver'.





Create Run/Debug Configuration: 'manage'

Name: manage ☐ Share ☐ Single instance only

Configuration | Logs

Script: ts/lino/book/lino_book/projects/min1/manage.py

Script parameters: runserver

Environment

Project: book

Environment variables: PYTHONUNBUFFERED=1

Python interpreter: Project Default (Python 2.7.12 virtualenv at ~/.virtu

Interpreter options:

Working directory: harmProjects/lino/book/lino_book/projects/min1

☑ Add content roots to PYTHONPATH

☑ Add source roots to PYTHONPATH

☐ Show command line afterwards

Before launch: Activate tool window

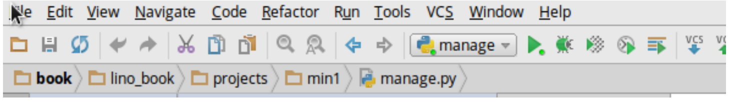
There are no tasks to run before launch

☐ Show this page ☑ Activate tool window

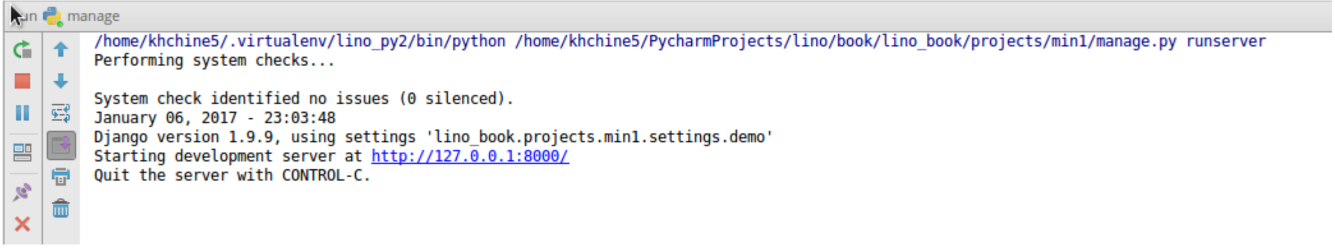
As you can see, this Run configuration will use our configured Python interpreter in Step 2.

4) Run a demo project

Once you create this configuration, you will be able to run and debug your project by clicking on the green arrow (at the right of ‘manage’) or the debugger-icon next to the arrow is the debugger (shaped like a bug)


File Edit View Navigate Code Refactor Run Tools VCS Window Help
manage
book
lino_book
projects
min1
manage.py

And you will get a similar output in your console

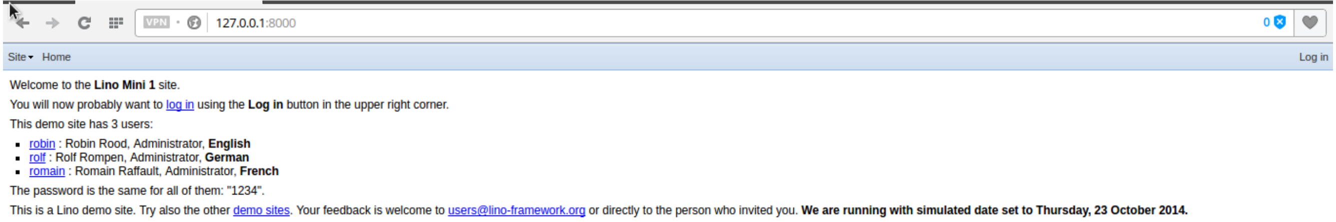


```
/home/khchine5/.virtualenv/lino_py2/bin/python /home/khchine5/PycharmProjects/lino/book/lino_book/projects/min1/manage.py runserver
Performing system checks...

System check identified no issues (0 silenced).
January 06, 2017 - 23:03:48
Django version 1.9.9, using settings 'lino_book.projects.min1.settings.demo'
Starting development server at http://127.0.0.1:8000/
Quit the server with CONTROL-C.
```

Before opening our browser, we need to populate our database the demo data by going to the book project and run the following command:
‘inv prep’

Now, we can open our browser at this link http://127.0.0.1:8000 and we get our first demo project running.



Welcome to the **Lino Mini 1** site.

You will now probably want to log in using the **Log in** button in the upper right corner.

This demo site has 3 users:

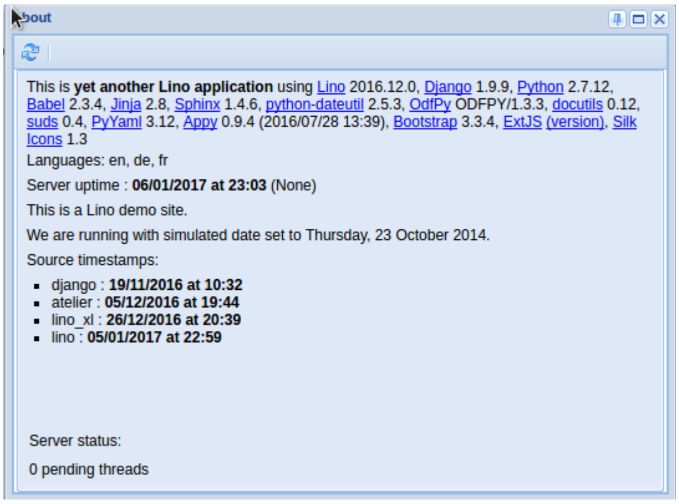
- robin : Robin Rood, Administrator, **English**
- rolf : Rolf Rompen, Administrator, **German**
- romain : Romain Raffault, Administrator, **French**

The password is the same for all of them: "1234".

This is a Lino demo site. Try also the other demo sites. Your feedback is welcome to users@lino-framework.org or directly to the person who invited you. **We are running with simulated date set to Thursday, 23 October 2014.**

5) Debug the demo project

Let’s for example debug the “About” window. We can find this window by opening the menu Site>About.



This is **yet another Lino application** using Lino 2016.12.0, Django 1.9.9, Python 2.7.12, Babel 2.3.4, Jinja 2.8, Sphinx 1.4.6, python-dateutil 2.5.3, OdfPy ODFPY/1.3.3, docutils 0.12, suds 0.4, PyYaml 3.12, Appy 0.9.4 (2016/07/28 13:39), Bootstrap 3.3.4, ExtJS (version), Silk Icons 1.3

Languages: en, de, fr

Server uptime : **06/01/2017 at 23:03** (None)

This is a Lino demo site.

We are running with simulated date set to Thursday, 23 October 2014.

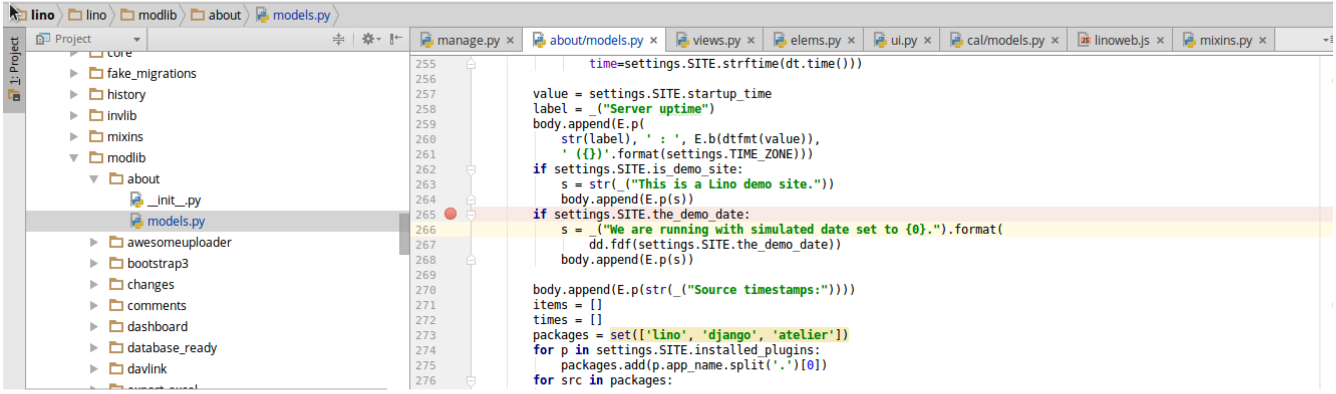
Source timestamps:

- django : **19/11/2016 at 10:32**
- atelier : **05/12/2016 at 19:44**
- lino_xl : **26/12/2016 at 20:39**
- lino : **05/01/2017 at 22:59**

Server status:

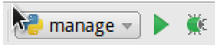
0 pending threads

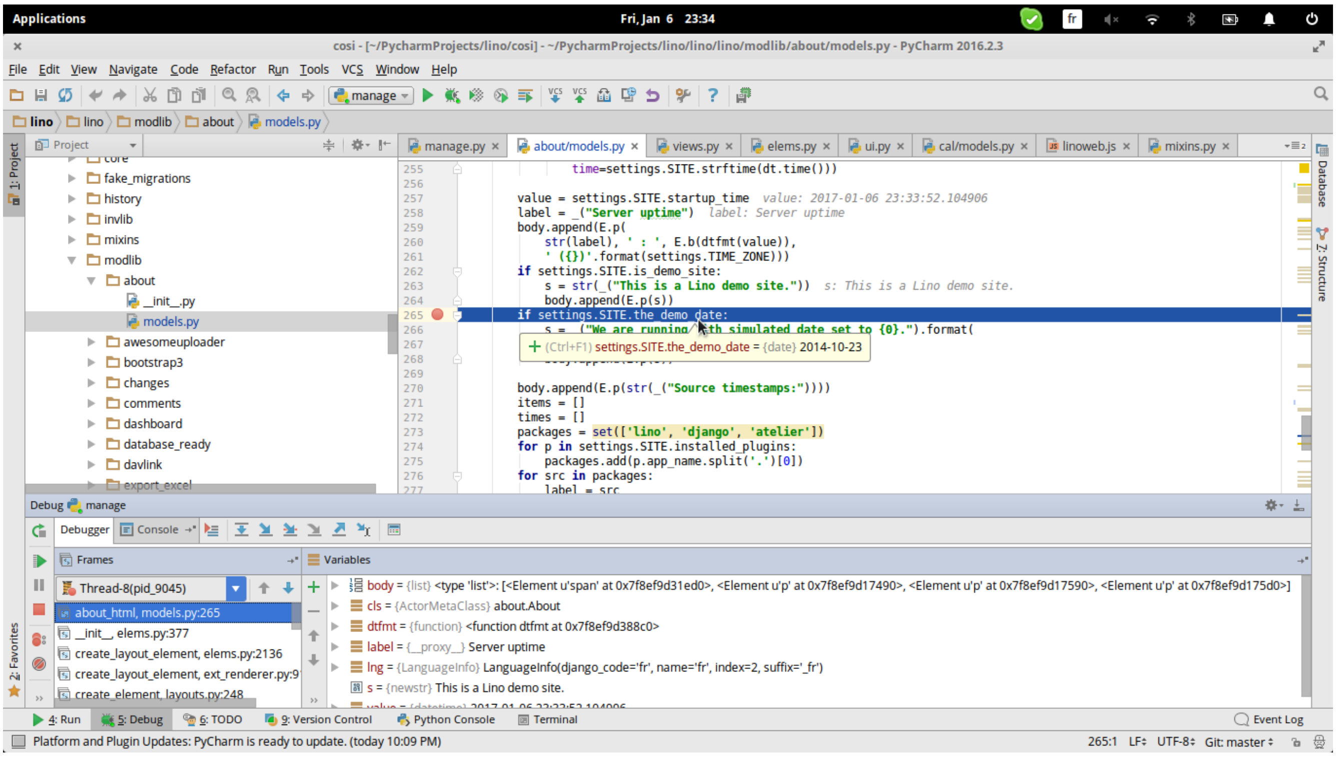
For fun, let’s debug the simulated date in this demo project.
In PyCharm, we open the file *lino/lino/modlib/about/models.py*



```
255                 time=settings.SITE.strftime(dt.time()))
256 
257         value = settings.SITE.startup_time
258         label = _("Server uptime")
259         body.append(E.p(
260             str(label), ' : ', E.b(dtfmt(value)),
261             ' ({})'.format(settings.TIME_ZONE)))
262         if settings.SITE.is_demo_site:
263             s = str(_("This is a Lino demo site."))
264             body.append(E.p(s))
265         if settings.SITE.the_demo_date:
266             s = _("We are running with simulated date set to {0}.").format(
267                 dd.fdf(settings.SITE.the_demo_date))
268             body.append(E.p(s))
269 
270         body.append(E.p(str(_("Source timestamps:"))))
271         items = []
272         times = []
273         packages = set(['lino', 'django', 'atelier'])
274         for p in settings.SITE.installed_plugins:
275             packages.add(p.app_name.split('.')[0])
276         for src in packages:
```

I added a new breakpoint at the line 265, I have stopped the run of my application and I started the debug mode by clicking on the bug-button at the right.
I open again my “About” window and the execution stop in my breakpoint





```
255                 time=settings.SITE.strftime(dt.time()))
256 
257         value = settings.SITE.startup_time  value: 2017-01-06 23:33:52.104906
258         label = _("Server uptime")  label: Server uptime
259         body.append(E.p(
260             str(label), ' : ', E.b(dtfmt(value)),
261             ' ({})'.format(settings.TIME_ZONE)))
262         if settings.SITE.is_demo_site:
263             s = str(_("This is a Lino demo site."))  s: This is a Lino demo site.
264             body.append(E.p(s))
265         if settings.SITE.the_demo_date:
266             s = _("We are running with simulated date set to {0}.").format(
267 
268 
269 
270         body.append(E.p(str(_("Source timestamps:"))))
271         items = []
272         times = []
273         packages = set(['lino', 'django', 'atelier'])
274         for p in settings.SITE.installed_plugins:
275             packages.add(p.app_name.split('.')[0])
276         for src in packages:
277             label = src
```

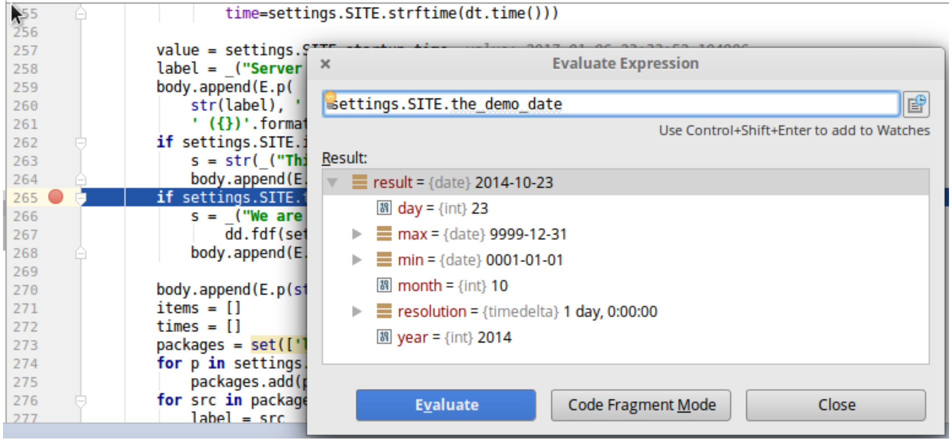
```
+ (Ctrl+F1) settings.SITE.the_demo_date = {date} 2014-10-23
```

```
Thread-8(pid_9045)
about_html, models.py:265
__init__, elems.py:377
create_layout_element, elems.py:2136
create_layout_element, ext_renderer.py:9
create_element, layouts.py:248
```

```
body = {list} <type 'list'>: [<Element u'span' at 0x7f8ef9d31ed0>, <Element u'p' at 0x7f8ef9d17490>, <Element u'p' at 0x7f8ef9d17590>, <Element u'p' at 0x7f8ef9d175d0>]
cls = {ActorMetaClass} about.About
dtfmt = {function} <function dtfmt at 0x7f8ef9d388c0>
label = {__proxy__} Server uptime
lng = {LanguageInfo} LanguageInfo(django_code='fr', name='fr', index=2, suffix='_fr')
s = {newstr} This is a Lino demo site.
value = {datetime} 2017-01-06 23:33:52.104906
```

```
Platform and Plugin Updates: PyCharm is ready to update. (today 10:09 PM)    265:1  LF÷  UTF-8÷  Git: master ÷
```

You can use the *Evaluate Expression* feature by pressing Ctrl+U.



```
            time=settings.SITE.strftime(dt.time()))

    value = settings.S
    label = _("Server
    body.append(E.p(
        str(label), '
        ' ({})'.format
    if settings.SITE.i
        s = str(_("Thi
        body.append(E.
    if settings.SITE.t
        s = _("We are
            dd.fdf(set
        body.append(E.

    body.append(E.p(st
    items = []
    times = []
    packages = set(['l
    for p in settings.
        packages.add(p
    for src in package
        label = src
```

Evaluate Expression

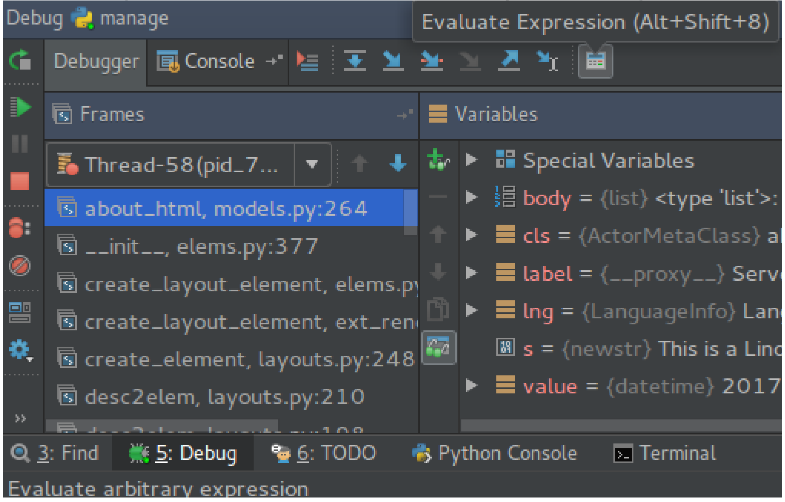
settings.SITE.the_demo_date

Use Control+Shift+Enter to add to Watches

Result:

```
▼ result = {date} 2014-10-23
      day = {int} 23
   ▶  max = {date} 9999-12-31
   ▶  min = {date} 0001-01-01
      month = {int} 10
   ▶  resolution = {timedelta} 1 day, 0:00:00
      year = {int} 2014
```

Please note that on some key-binding-sets Ctrl+U is not default, you can find out what your binding is by either hovering over the icon for *Evaluate Expression* in the debug tab (Alt-5) or in the key-bindings settings.



```
Thread-58(pid_7...
about_html, models.py:264
__init__, elems.py:377
create_layout_element, elems.py
create_layout_element, ext_ren
create_element, layouts.py:248
desc2elem, layouts.py:210
```

```
▶ Special Variables
▶ body = {list} <type 'list'>:
▶ cls = {ActorMetaClass} a
▶ label = {__proxy__} Serv
▶ lng = {LanguageInfo} Lan
  s = {newstr} This is a Lino
▶ value = {datetime} 2017
```

Evaluate arbitrary expression