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VOLTTRON FEATURE HIGHLIGHTS

September 25, 2019

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VOLTTRON™

In this talk

- Highlight some underutilized VOLTTRON features (fan favorites)
- Get feedback about user interests
- Demonstrate the features during afternoon working session

Configuration Store

- Provides storage for agent configurations outside of the agent package
- Alternative to packaging a configuration file with the agent
- Dynamically change configuration without having to restart the agent

Example Use cases:

- Master driver – add or remove a device, update scrapping interval
- Make a historian read only
- Useful to copy configuration of multiple agents across distribution
- You can add the configuration store in a git repository

Add and edit to configuration store using:

vctl config commands

Configuration Store

- Add and edit to configuration store using **volttron-ctl config** commands
  - vctl config **store** <agent vip identity> <configuration name> <infile> --<filetype>
  - vctl config **edit** <agent vip identity> <configuration name>
  - vctl config **list**
  - vctl config **list** <agent vip identity>
  - vctl config **get** <agent vip identity> <configuration name>
  - vctl config **delete** <agent vip identity> <configuration name>
- The Platform Configuration Store informs agents of changes to their configuration store
- Agent code should subscribe to configuration store updates and respond to changes accordingly
- Each agent by default has access only to its own configuration store

Protected pubsub topics

- Platform owner can limit who can publish to a given topic
- Protects subscribers on that platform from receiving messages from unauthorized publishers
- To setup:
  - Add topic name to $VOLTTRON_HOME/protected_topics.json

    { "write-protect": [{"topic": "foo", "capabilities": ["can_publish_to_foo"]}] }

    { "write-protect": [{"topic": ”/foo/*.*/", "capabilities": ["can_publish_to_foo"]}] }

  - Add the capability “can_publish_to_foo” to the authorized agent, say AgentA, using

    vctl auth add --user_id AgentA --credentials J1GTSqMrf5t3GDYFKMEOkMxkRorrXN-mJ_M_yRv1dBk --capabilities can_publish_to_foo

  - Now AgentA can publish to topic ”foo”

    self.vip.pubsub.publish('pubsub', 'foo', message='Here is a message')

Protected RPC methods

Protected RPC methods

- Agent's exposed RPC methods can also be protected using capabilities

```
@RPC.allow('CAP_SET_TEMP')
@RPC.export
def set_temperature(temp):
```

- Can require more than one permission to allow access

```
@RPC.allow(['CAP_SET_TEMP', 'CAP_FOO_BAR'])
                    or
@RPC.allow('CAP_SET_TEMP')
@RPC.allow('CAP_FOO_BAR')
```

- Platform owner can grant access to a specific agent to access set_temperature by adding the capability/capabilities to the agent's auth entry

```
vctl auth add
vctl auth update
```

Protected RPC methods

- Can also restrict call to methods with only certain runtime parameters
- Example: Configuration Store

```
@RPC.export
@RPC.allow('edit_config_store')
def manage_store(self, identity, config_name, raw_contents, config_type="raw"):
```

- An agent's (say in the below example agent1) default capability is:

```
"capabilities": {
        "edit_config_store": { "identity": "agent1" }
 }
```

agent1.vip.rpc.call(CONFIGURATION_STORE, 'manage_store',
"**agent1**", "config", json_config, config_type="json").get() ✓

agent1.vip.rpc.call(CONFIGURATION_STORE, 'manage_store',
"**agent2**", "config", json_config, config_type="json").get() ✗

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Tagging Service

- Add semantic tags to topics, enabling queries by tags instead of topic name
- Not relying on everyone following a naming convention
- VOLLTTRON will use tags from Project Haystack.
- Tags are imported and grouped by categories
- Tag individual components of a topic such as campus, building, device, point etc.
- Add tag to multiple topics based on topic pattern
- Query topics based on tags.
- Example:
  - Give me all the Air Handling Units in Building 1
  - Give me all outdoor air temperatures
  - Give me all power measurements

Agent Template

- Creates the directory structure and a well documented code template to do common tasks in VOLTTRON.
- vpkg init <agent directory name> <agent package name>

```
TestAgent/
    ├── setup.py
    ├── config
    └── tester
        ├── agent.py
        └── __init__.py
```

- Code auto generated for
  - setup.py
  - Agent initialization
  - Managing subscriptions and RPC calls
  - Agent lifecycle events
  - Configuration store support.

Agent Examples

Useful collection of example agents under volttron/examples

- ListenerAgent
- Standalone Agent
- CSVHistorian

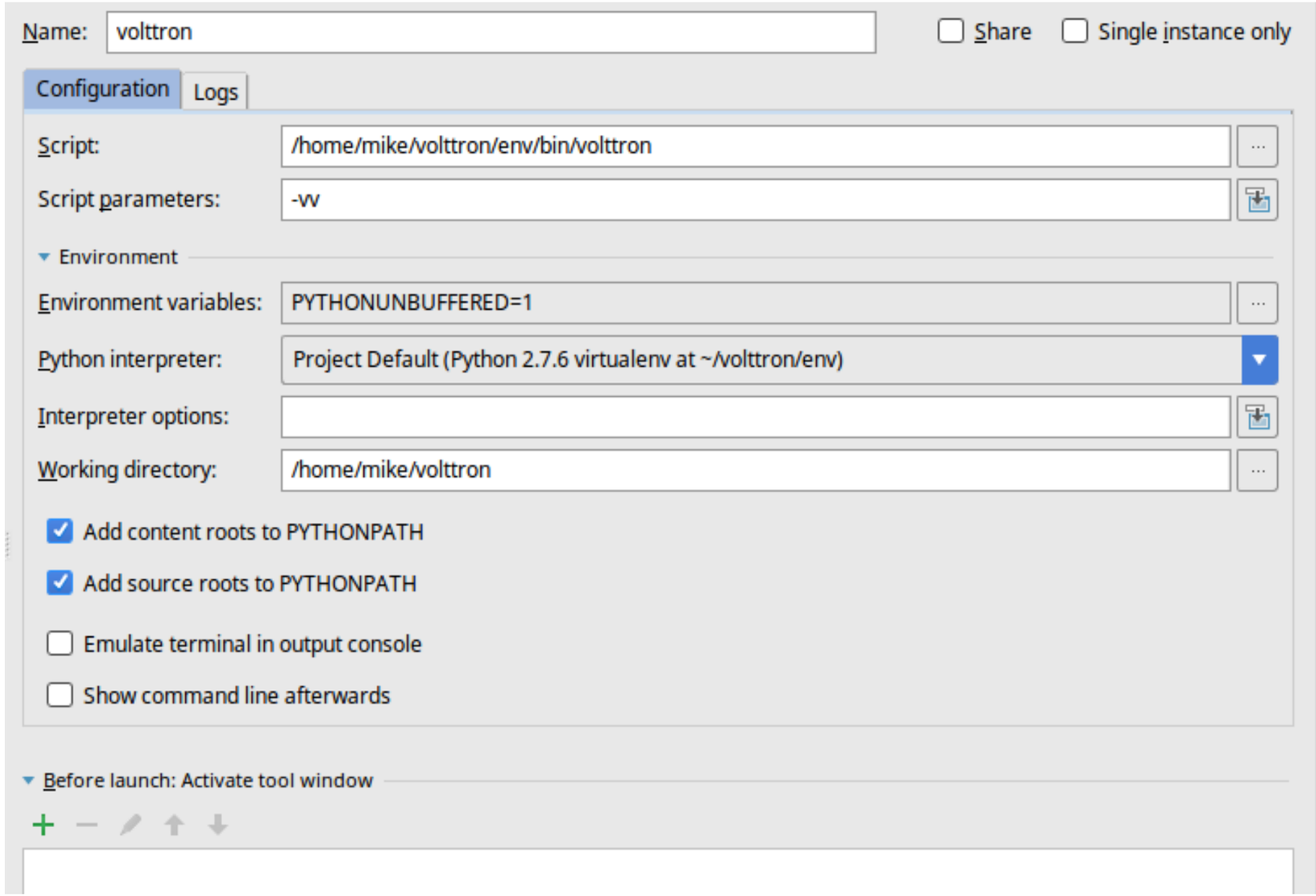
- Integration with other code/applications:
  - ✓ Matlab
  - ✓ C Agent
  - ✓ FNCS

Debugging Agents

- You can start VOLTTRON process and agents within PyCharm IDE in debug mode
- More efficient to debug with break points than adding print statements
- Can also debug pytests from within PyCharm

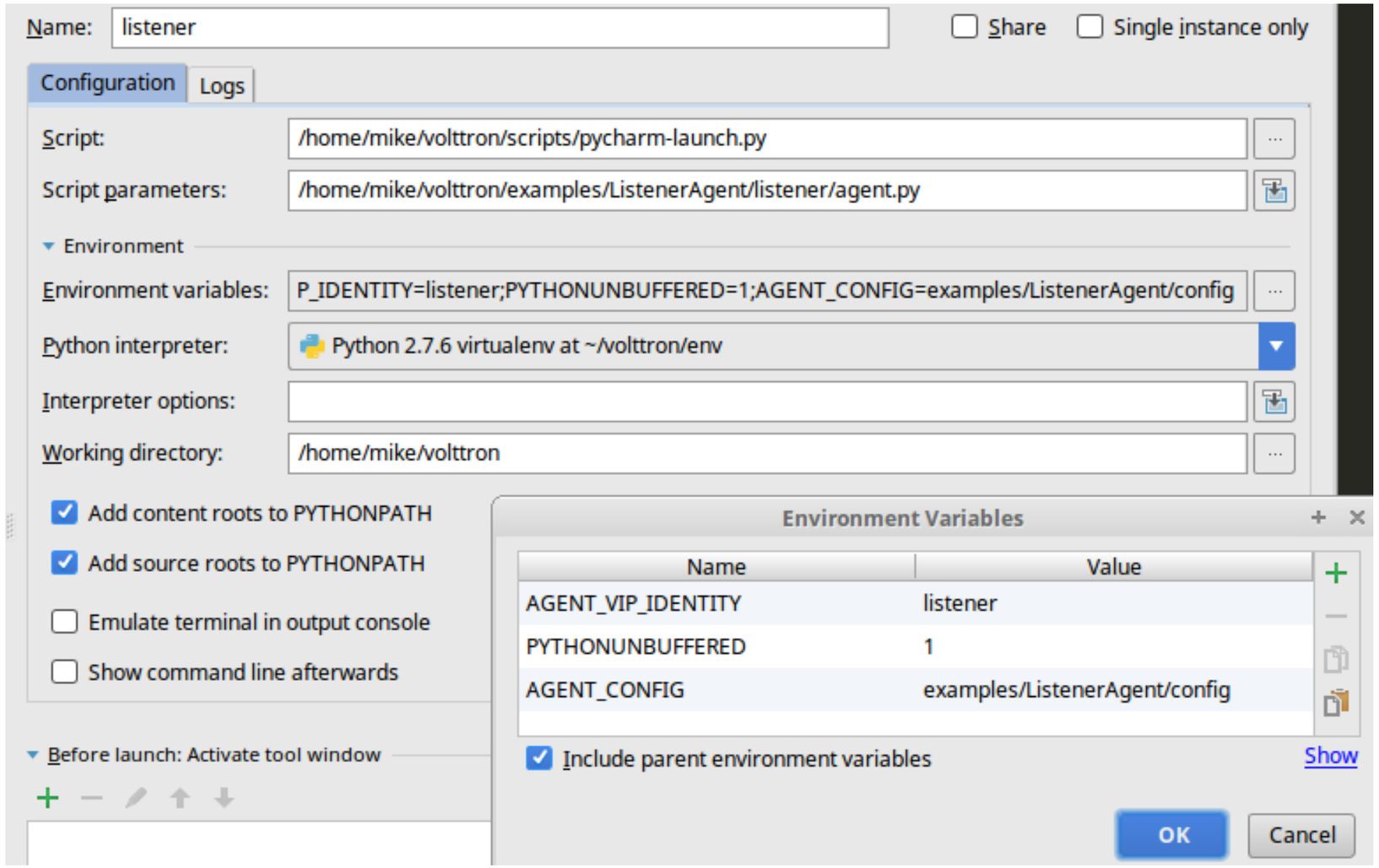
Running VOLTTRON within PyCharm

- Enable Gevent compatibility
- Import checked out VOLTTRON code
- Set project interpreter as <volttronsrc>/env/bin/python
- Launch python code <volttronsrc>/env/bin/volttron with working directory = <volttronsrc>



Running agent within python

- Run the scripts/pycharm-launch.py and provide the agent's agent.py file as the parameter
- Set environment variables:
  - AGENT_VIP_IDENTITY
  - AGENT_CONFIG



Agent priority

- Agents can be started on VOLTTRON startup
- Agents can start in specific order by assigning priority

- Useful for
  - Dependent agents
  - Example - start historians before master driver

- Set using:
  volttron-ctl enable <AGENT_UUID> <PRIORITY>
  Integer between 0 – 100
  Default : 50

Agent grouping with tags

Tagging Agents:

```
python scripts/install-agent.py  -s examples/ListenerAgent --tag listener
volttron-ctl tag <AGENT_UUID> <TAG>
```

Uses: Group one or more agents with a single tag or tag pattern

- Can be used instead of agent uuid in VOLTTRON commands (using --tag)
- Can start or stop multiple agents with single command

  ```
  vctl start --tag historians
  ```

- Can start or stop using tagname_wildcard (--tag historians_*)

  ```
  vctl start --tag historian_*
  ```

Links to documentation

- https://volttron.readthedocs.io/en/develop/core_services/config_store/index.html
- https://volttron.readthedocs.io/en/develop/devguides/agent_development/Agent-Development.html
- https://volttron.readthedocs.io/en/develop/specifications/tagging_service.html
- https://volttron.readthedocs.io/en/develop/devguides/supporting/examples/MatLabAgent.html
- https://project-haystack.org/tag

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Thank you