

The Difference Engine for Unlocking the Kafka Black Box

ralph.debusmann@forecasty.ai

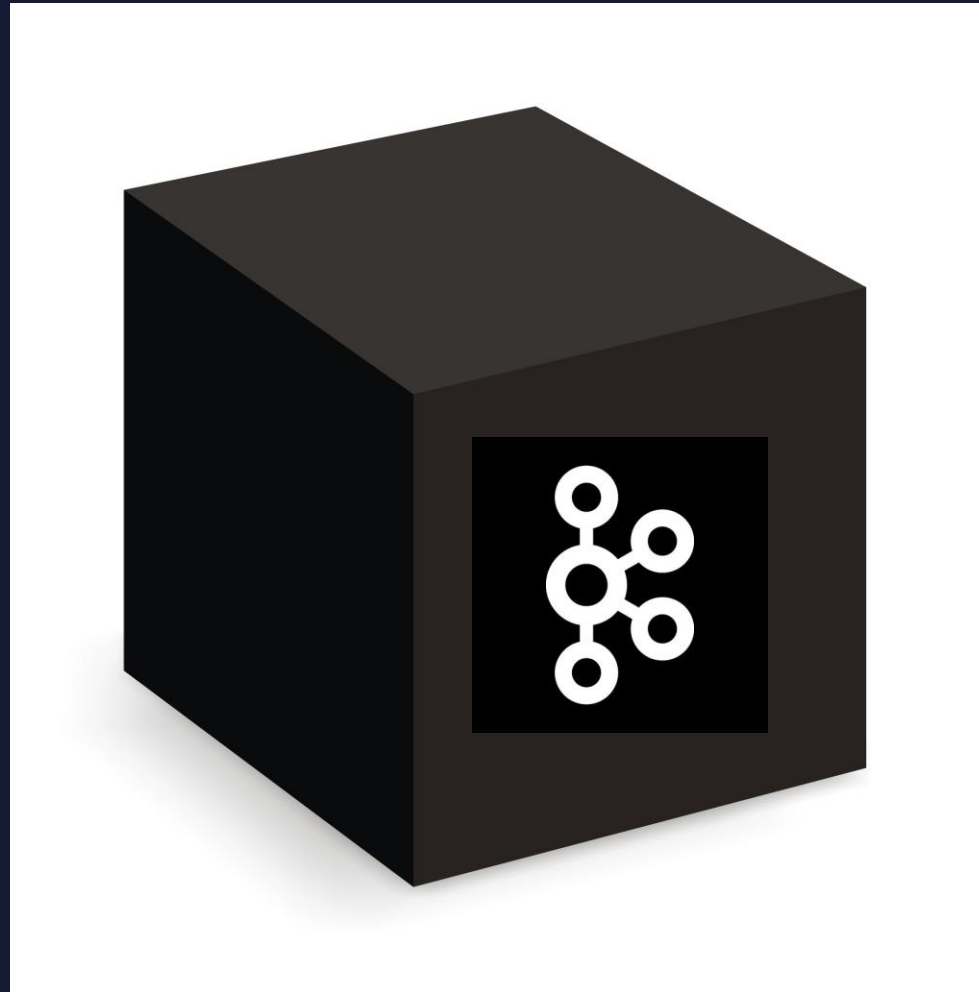
Please dd



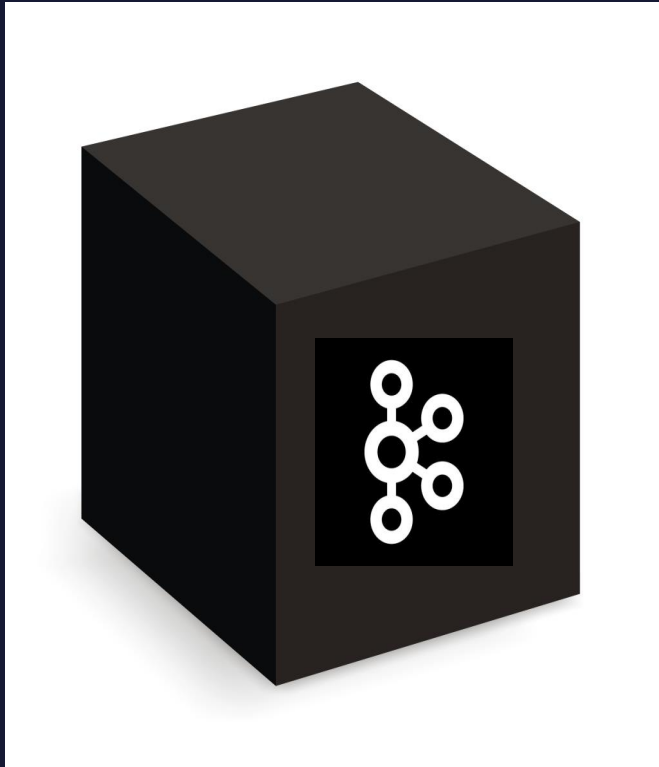
No-Code Deep Tech for the Future.



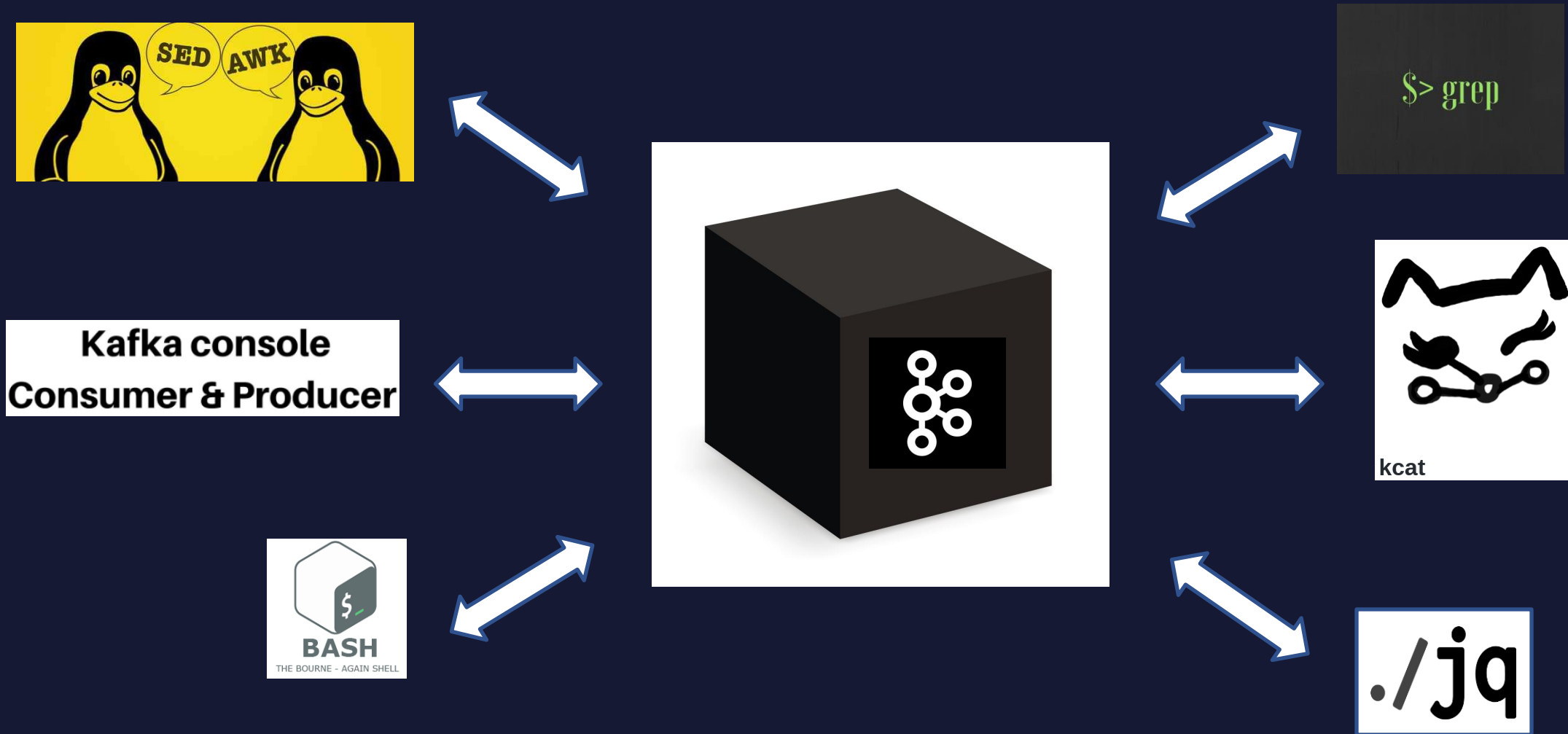
“Kafka is Like a Black Box – You Can’t See What’s Inside”



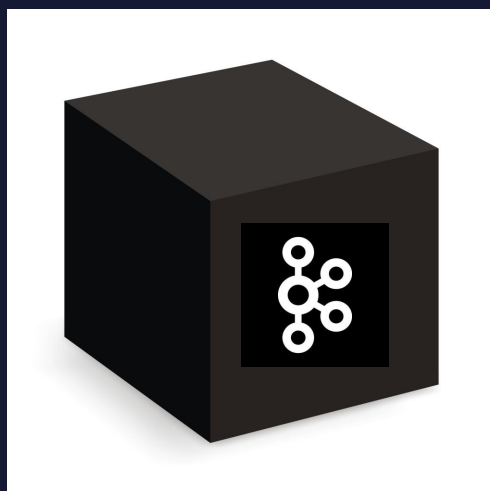
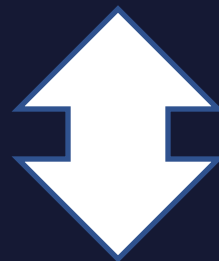
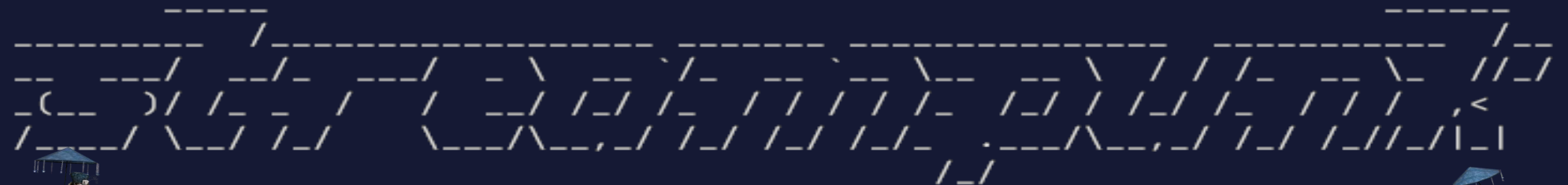
1. Transfer the Data from the Topics to a Database



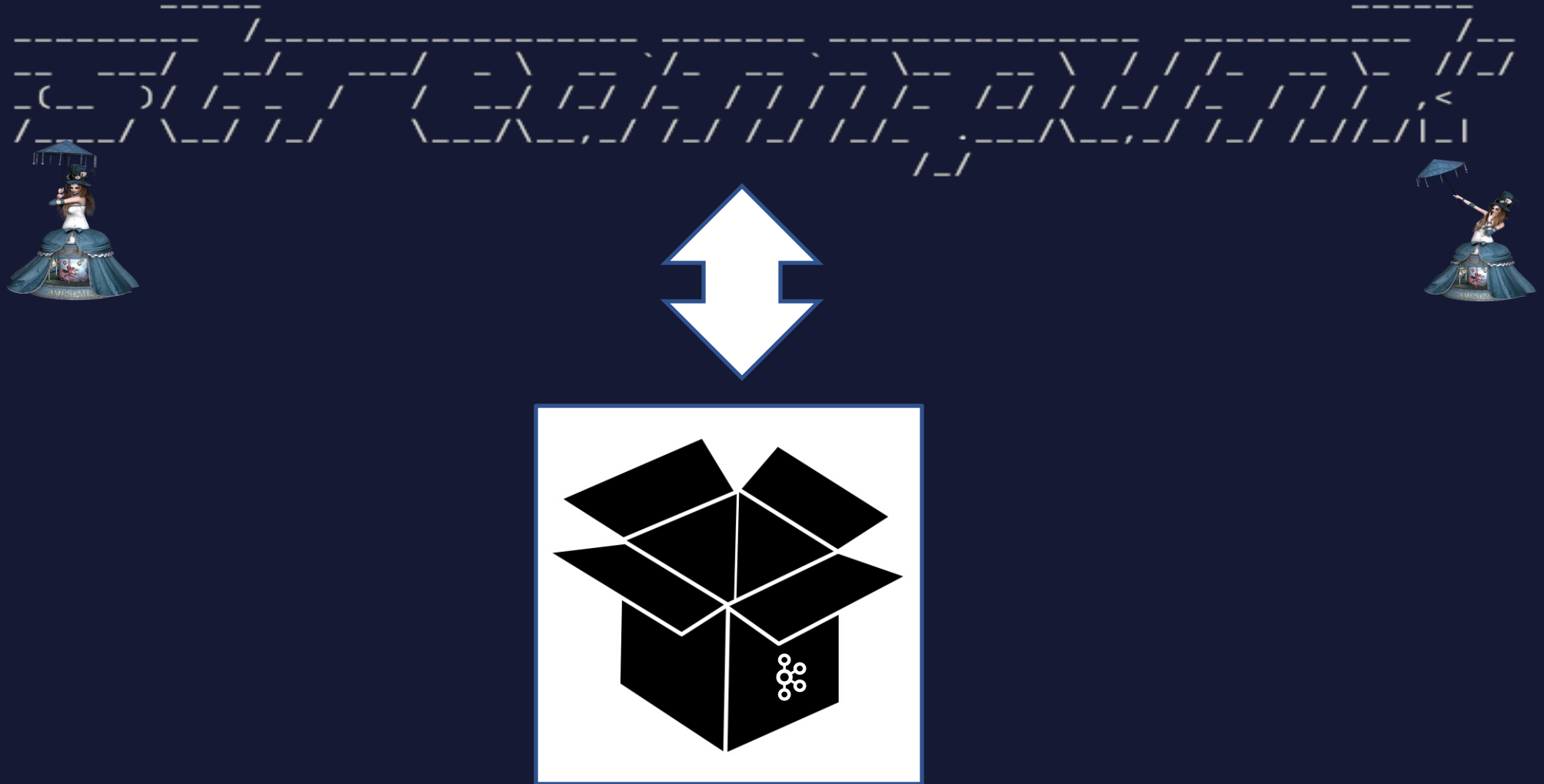
2. Use the well-known eclectic mix of Bash, Apache Kafka CLI tools, kcat...



This Is How Steampunk Was Born



Streampunk Unlocks the Kafka Black Box

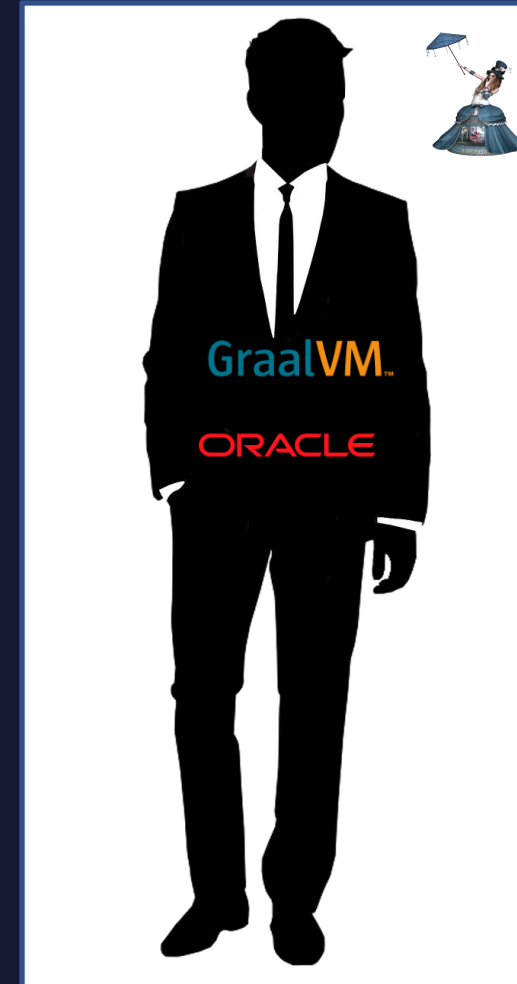


Streampunk is a Polyglot Programmable Shell for Kafka



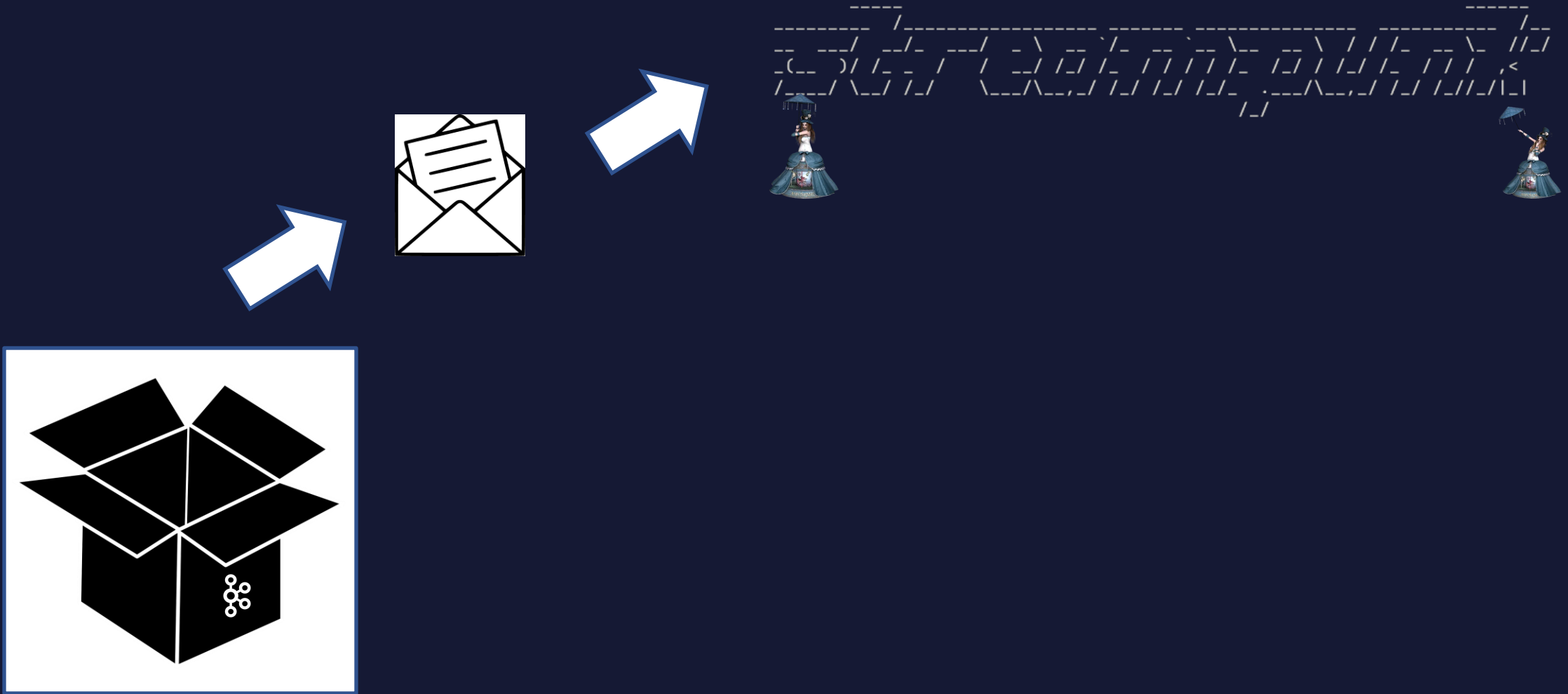
Streampunk Is Standing on the Shoulders of Giants

Streampunk Is Standing on the Shoulders of Giants

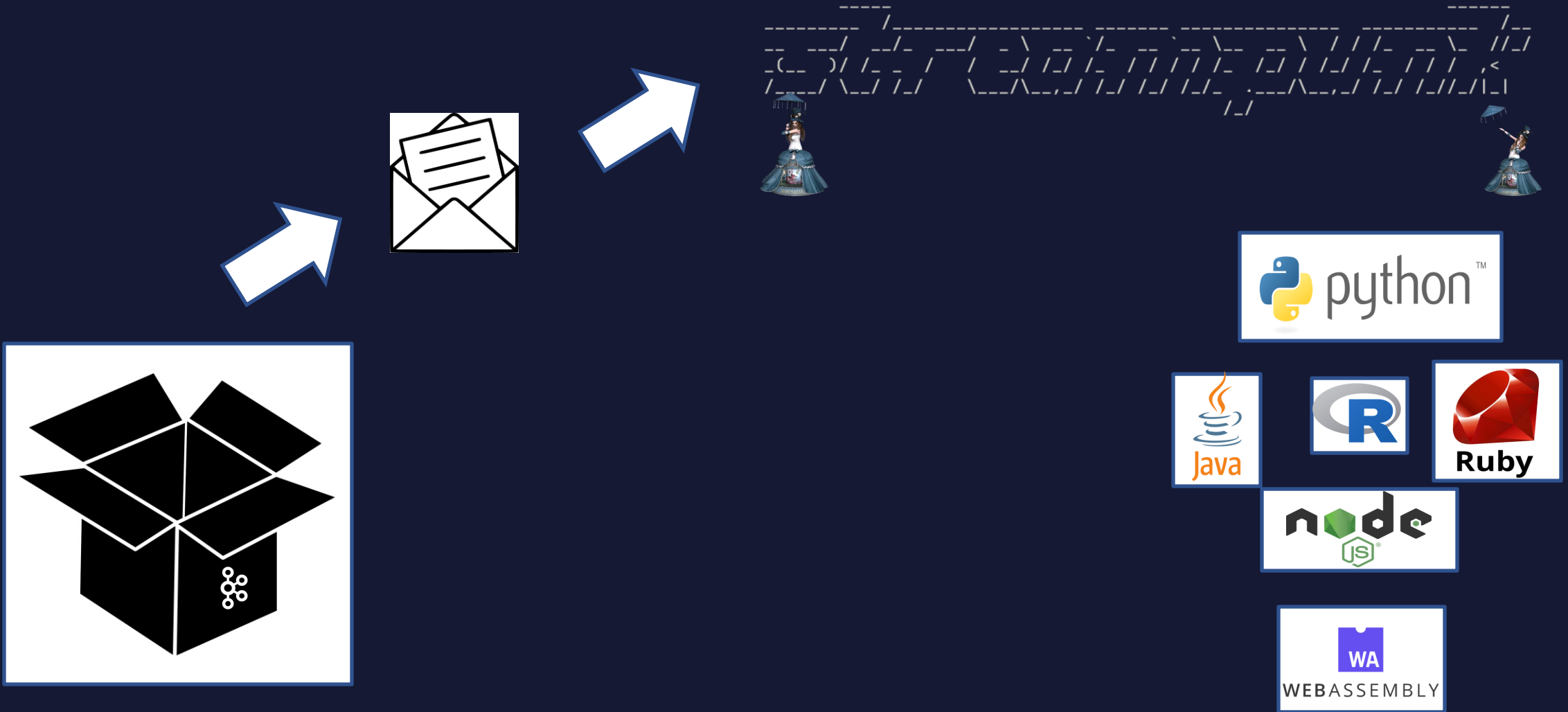




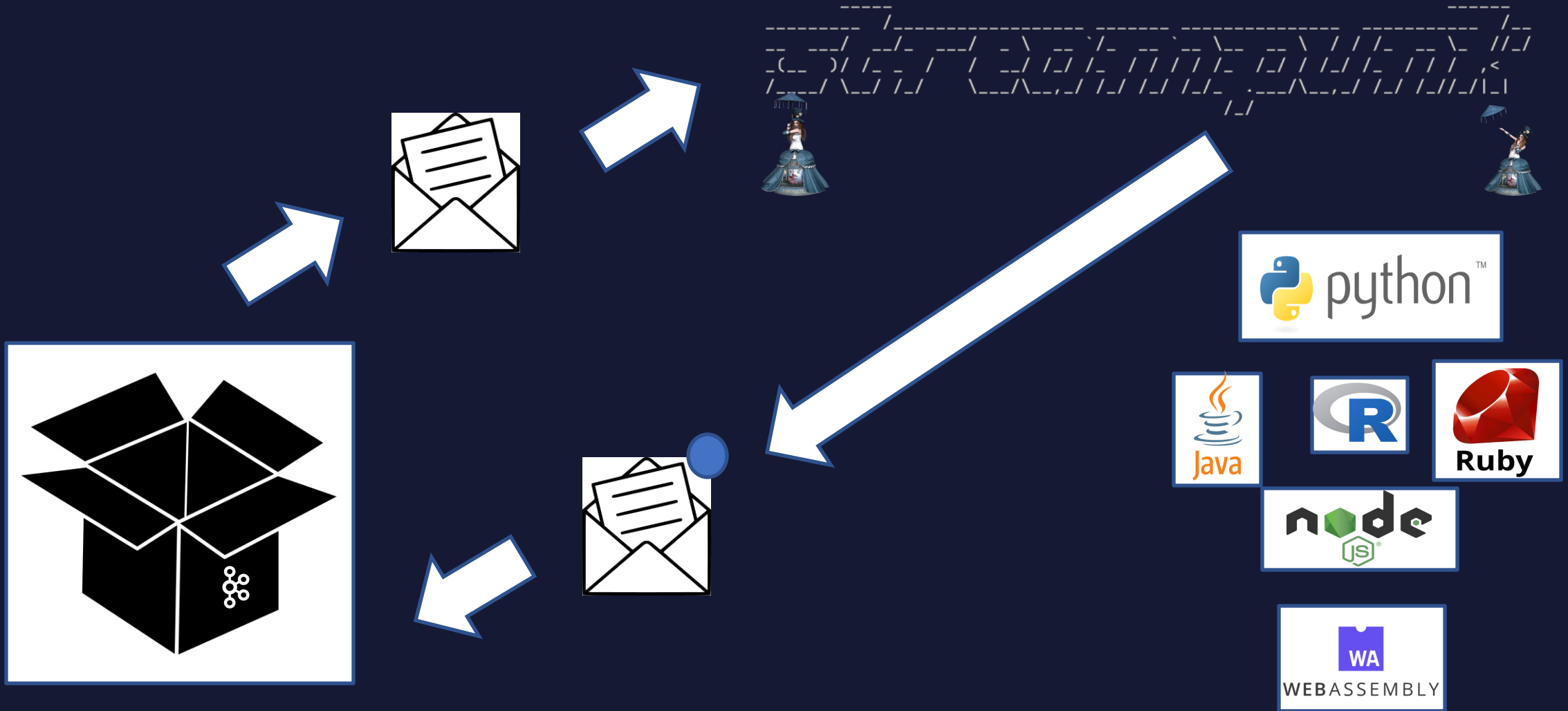
Streampunk Enables Polyglot Message Transforms for All Kafkas



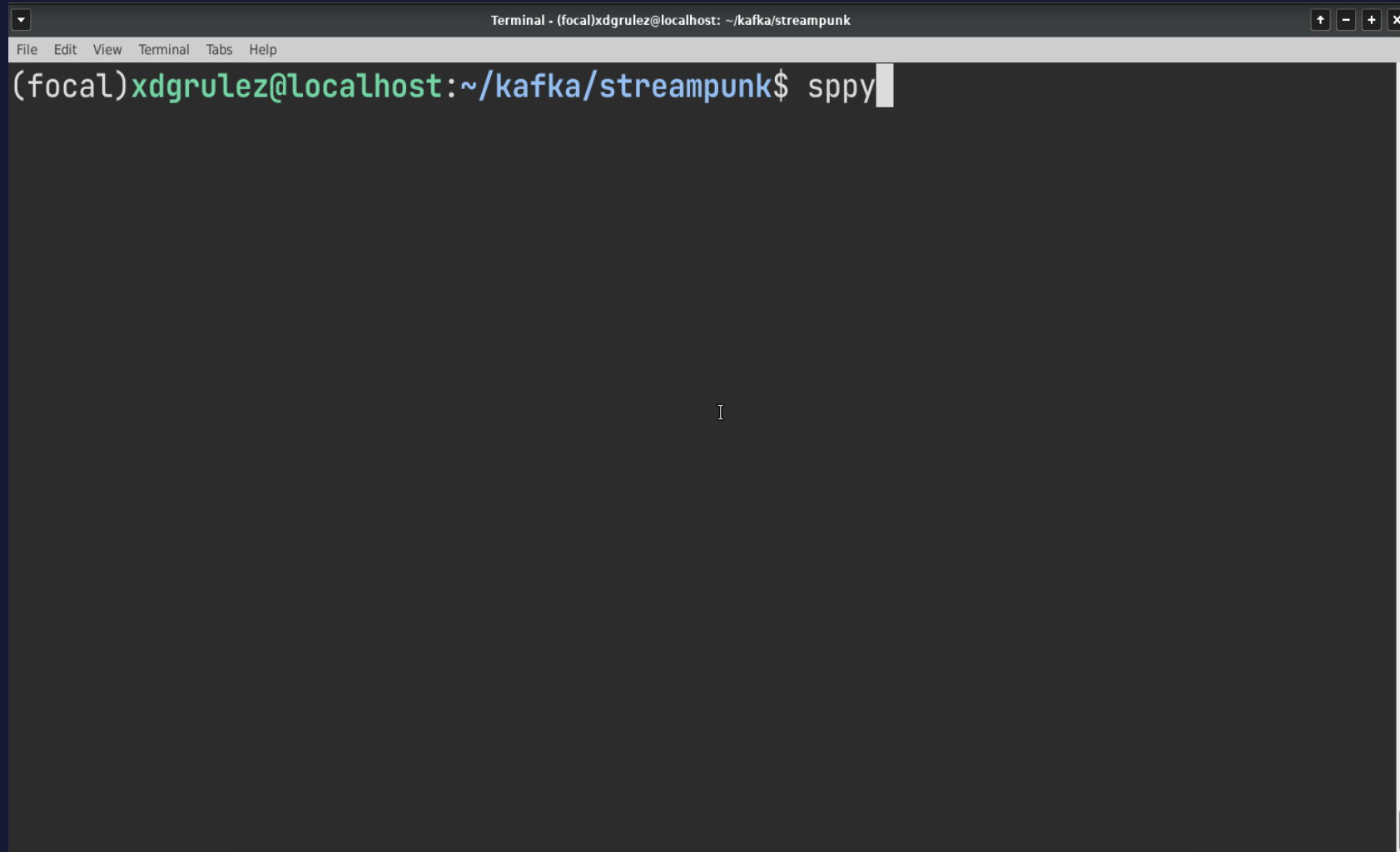
Streampunk Enables Polyglot Message Transforms for All Kafkas



Streampunk Enables Polyglot Message Transforms for All Kafkas



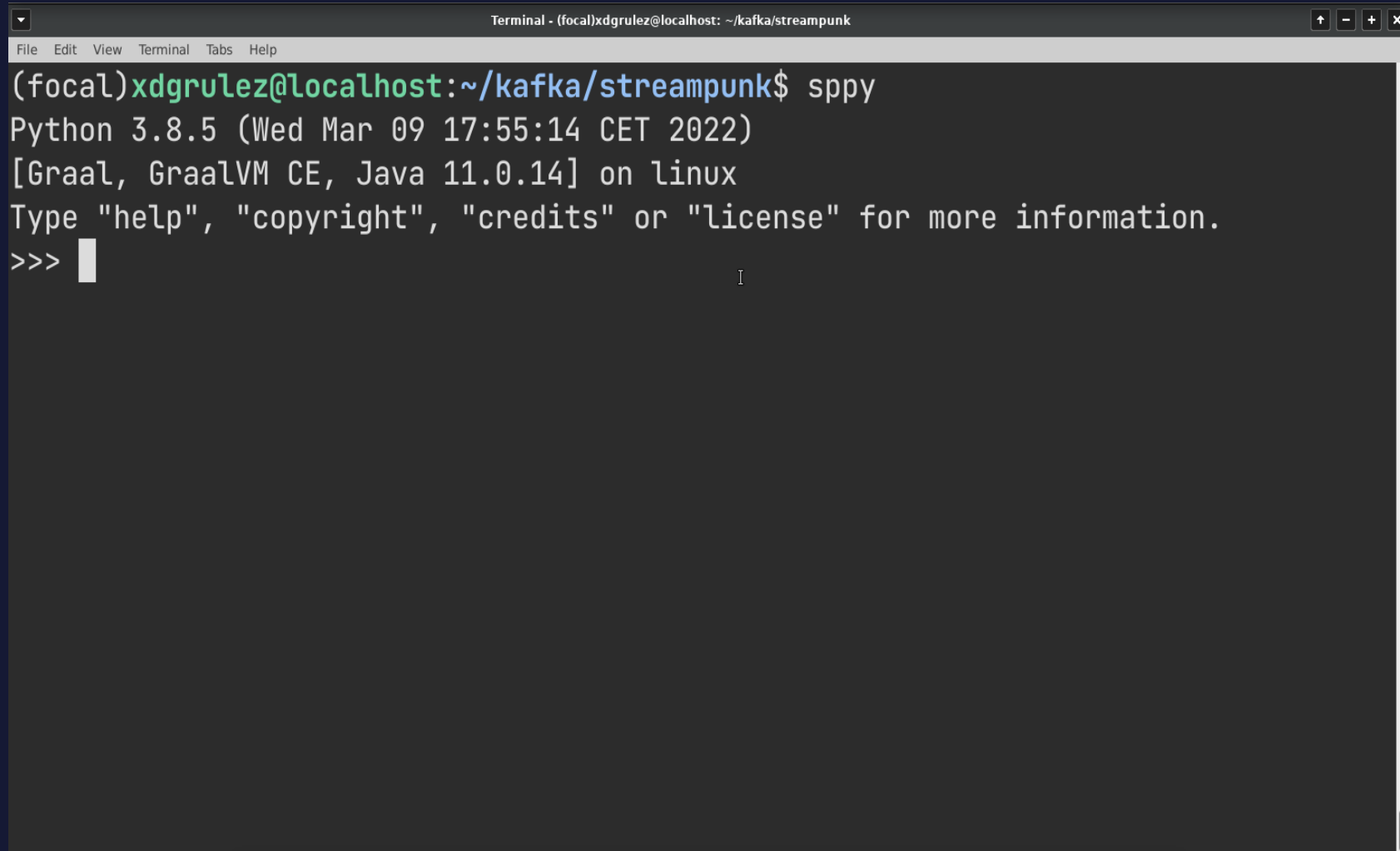
Streampunk in Action



```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
(focal)xdgrulez@localhost:~/kafka/streampunk$ sppy
```

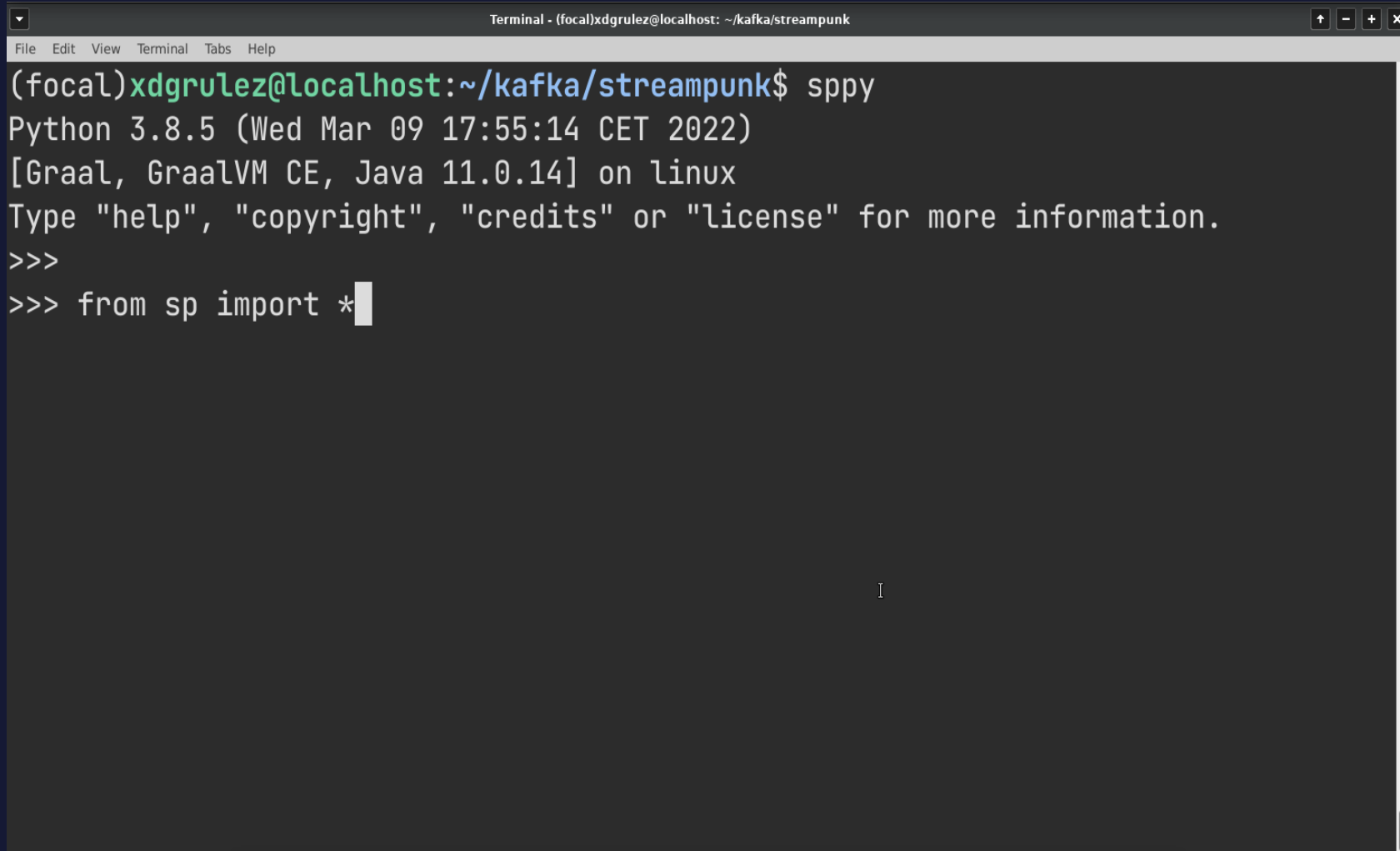


Streampunk in Action

A terminal window titled "Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The terminal shows the command "(focal)xdgrulez@localhost:~/kafka/streampunk\$ sppy" and its output: "Python 3.8.5 (Wed Mar 09 17:55:14 CET 2022)", "[Graal, GraalVM CE, Java 11.0.14] on linux", and "Type 'help', 'copyright', 'credits' or 'license' for more information." followed by a prompt ">>>".

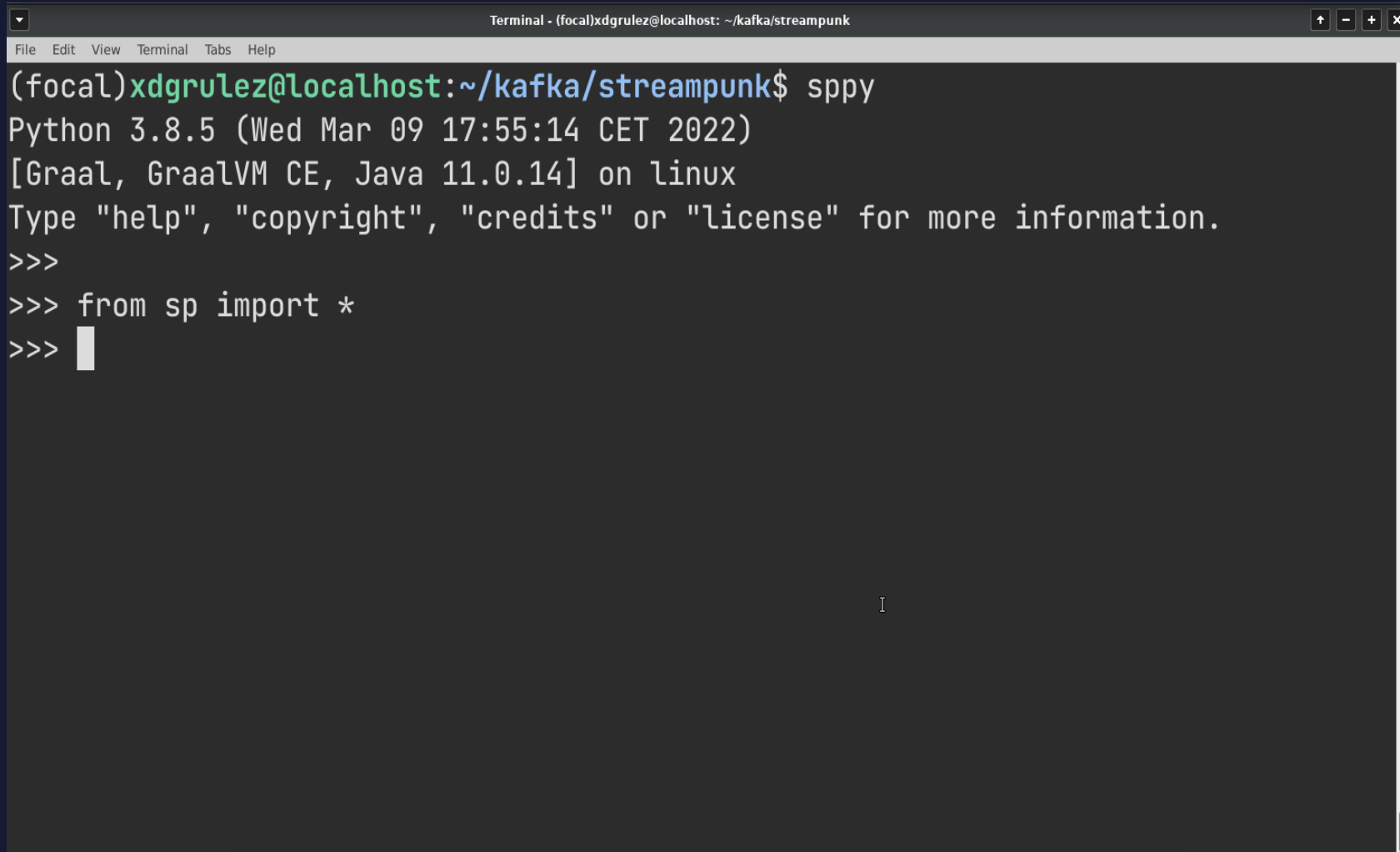
```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
(focal)xdgrulez@localhost:~/kafka/streampunk$ sppy
Python 3.8.5 (Wed Mar 09 17:55:14 CET 2022)
[Graal, GraalVM CE, Java 11.0.14] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> 
```

Streampunk in Action

A terminal window titled "Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk" with standard window controls. The terminal shows the execution of the 'sppy' command, which displays the Python version (3.8.5), date and time (Wed Mar 09 17:55:14 CET 2022), and the underlying technology stack (Graal, GraalVM CE, Java 11.0.14) on Linux. It also provides instructions on how to get help, copyright, credits, or license information. The prompt then changes to a Python REPL style (>>>), and the user enters the command 'from sp import *'.

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
(focal)xdgrulez@localhost:~/kafka/streampunk$ sppy
Python 3.8.5 (Wed Mar 09 17:55:14 CET 2022)
[Graal, GraalVM CE, Java 11.0.14] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> from sp import *
```

Streampunk in Action

A terminal window titled "Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk" with standard window controls. The terminal shows the execution of 'sppy', which starts a Python 3.8.5 shell. The shell output includes the date and time (Wed Mar 09 17:55:14 CET 2022), the Java version (11.0.14), and the operating system (linux). It also provides instructions on how to use 'help', 'copyright', 'credits', or 'license'. The user enters '>>>' and '>>> from sp import *', followed by another '>>>' with a cursor, indicating the start of a Python script.

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
(focal)xdgrulez@localhost:~/kafka/streampunk$ sppy
Python 3.8.5 (Wed Mar 09 17:55:14 CET 2022)
[Graal, GraalVM CE, Java 11.0.14] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> from sp import *
>>> █
```


Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
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Python 3.8.5 (Wed Mar 09 17:55:14 CET 2022)
[Graal, GraalVM CE, Java 11.0.14] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> from sp import *
>>>
>>> Topic.create("local", "input", 1)
```



Streampunk in Action

```
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File Edit View Terminal Tabs Help
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Python 3.8.5 (Wed Mar 09 17:55:14 CET 2022)
[Graal, GraalVM CE, Java 11.0.14] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> from sp import *
>>>
>>> Topic.create("local", "input", 1)
None
>>> 
```

Streampunk in Action

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Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
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(focal)xdgrulez@localhost:~/kafka/streampunk$ sppy
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[Graal, GraalVM CE, Java 11.0.14] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> from sp import *
>>>
>>> Topic.create("local", "input", 1)
None
>>> ProducerString.produce("local", "input", "z")
```

Streampunk in Action

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Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
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Streampunk in Action

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>>> █
```

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>>> 
```

Streampunk in Action

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Type "help", "copyright", "credits" or "license" for more information.
>>>
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>>>
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None
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Streampunk in Action

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File Edit View Terminal Tabs Help
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None
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>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> 
```



Streampunk in Action

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Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
>>>
>>> from sp import *
>>>
>>> Topic.create("local", "input", 1)
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> Topic.getTotalSize("local", "input")
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
>>>
>>> Topic.create("local", "input", 1)
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> Topic.getTotalSize("local", "input")
6
>>> █
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
>>>
>>> Topic.create("local", "input", 1)
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> ProducerString.produce("local", "input", "z")
None
>>> Topic.getTotalSize("local", "input")
6
>>> ConsumerString.consume("local", "input", "test", None)
```

Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
>>> ConsumerString.consume("local", "input", "test", None)

Topic: input, Partition: 0, Offset: 0, Timestamp: 2022-04-22 13:24:12.505
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 1, Timestamp: 2022-04-22 13:24:28.121
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 2, Timestamp: 2022-04-22 13:24:40.178
Headers:
Key: null
Value: z

Continue (Y/n)? █
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Continue (Y/n)?

Topic: input, Partition: 0, Offset: 3, Timestamp: 2022-04-22 13:24:52.781
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)?
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Continue (Y/n)?

Topic: input, Partition: 0, Offset: 3, Timestamp: 2022-04-22 13:24:52.781
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Topic: input, Partition: 0, Offset: 3, Timestamp: 2022-04-22 13:24:52.781
Headers:
Key: null
Value: z

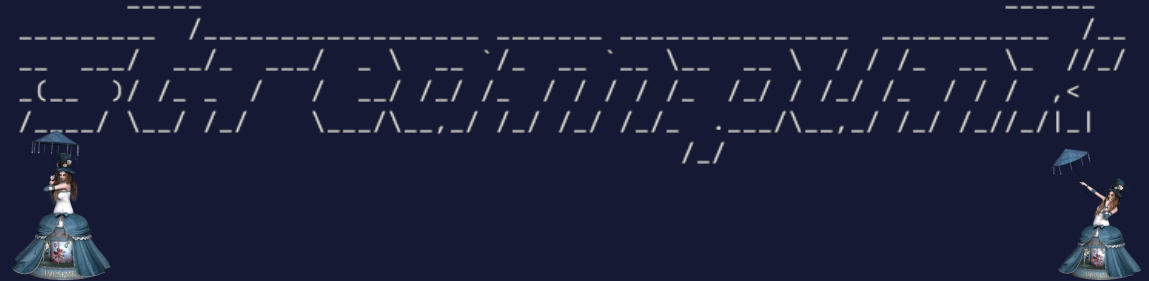
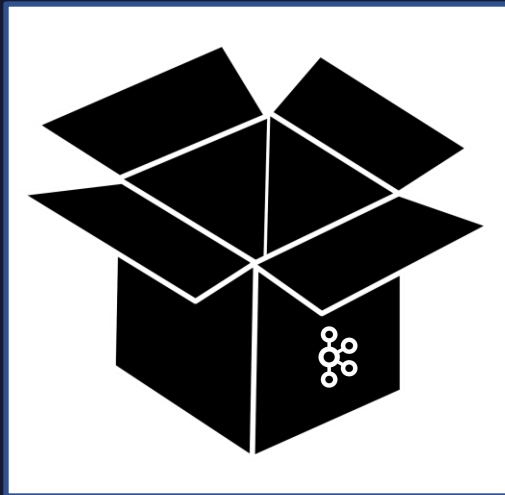
Topic: input, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

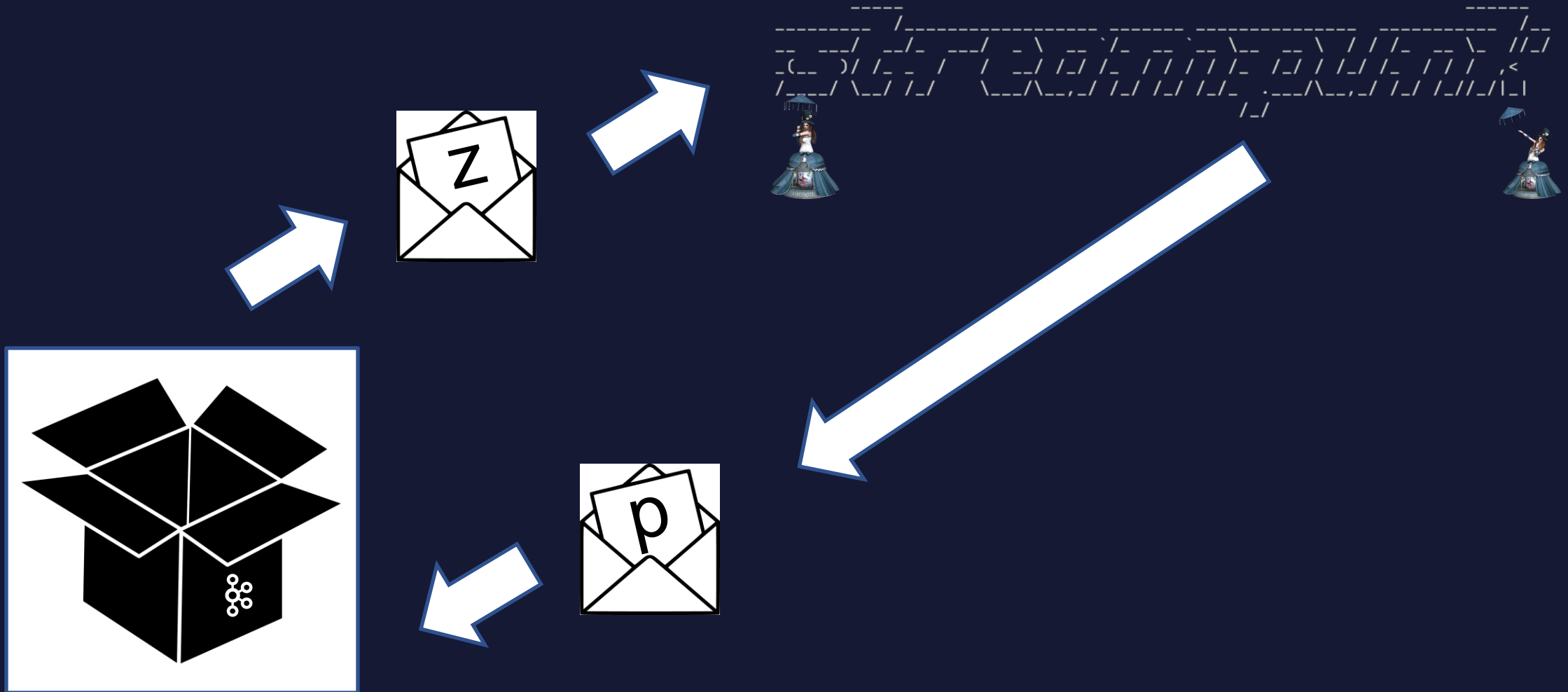
Continue (Y/n)? n
None
>>> █
```



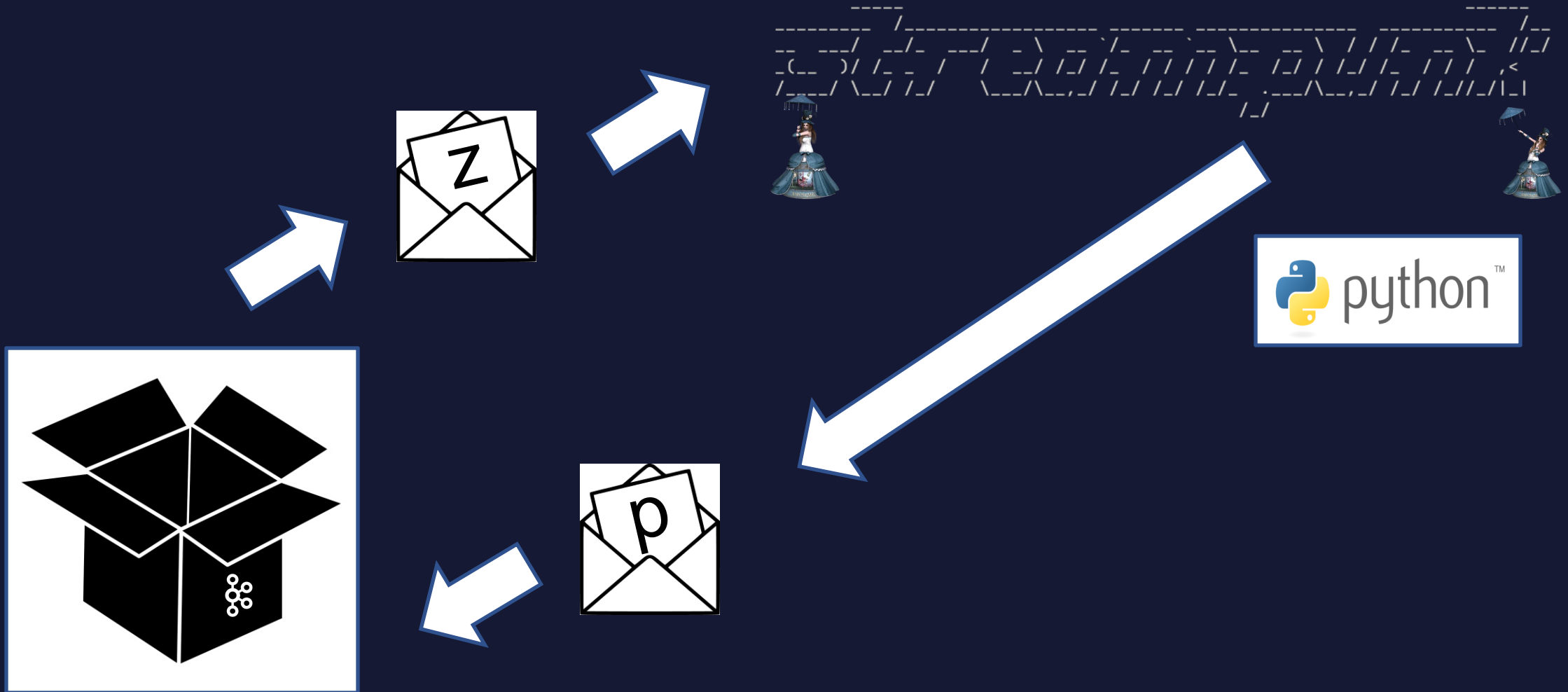
Transform Zs to Ps



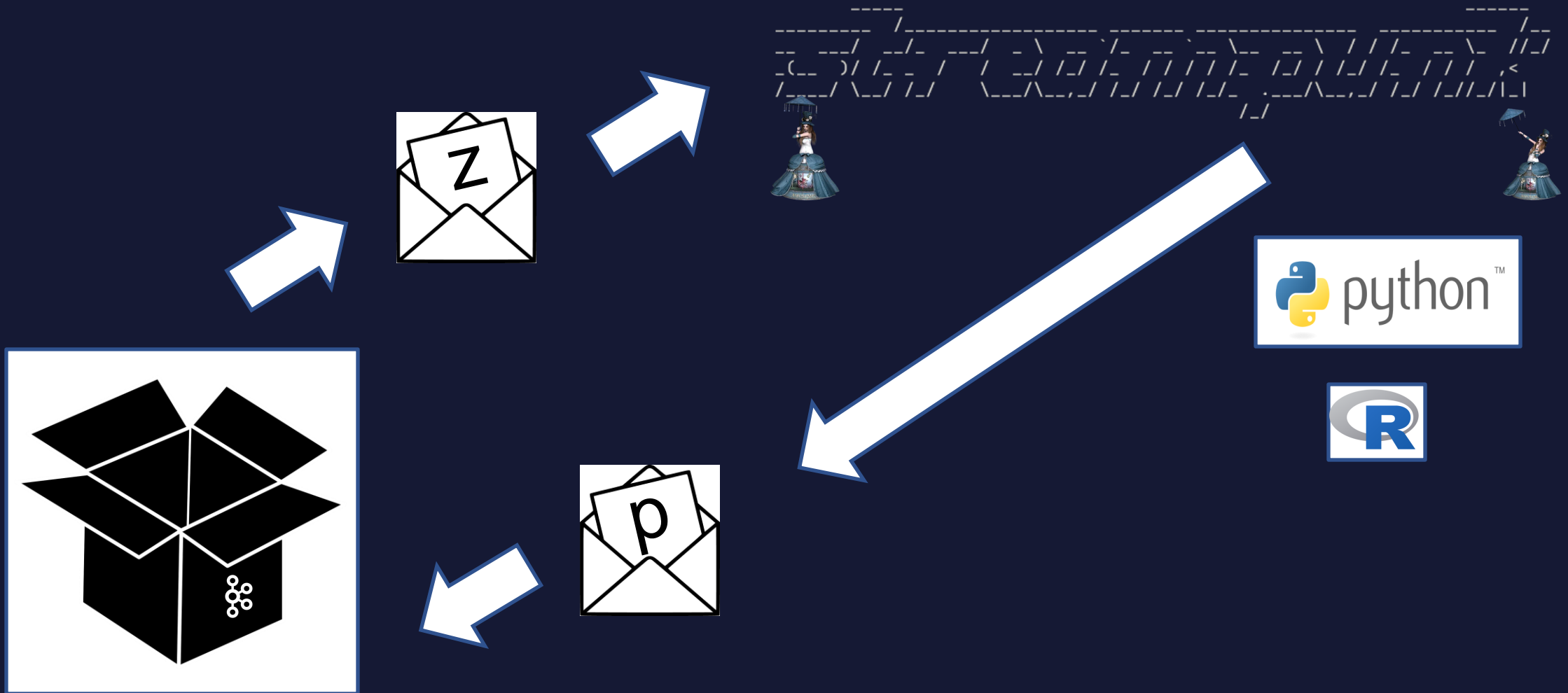
Transform Zs to Ps



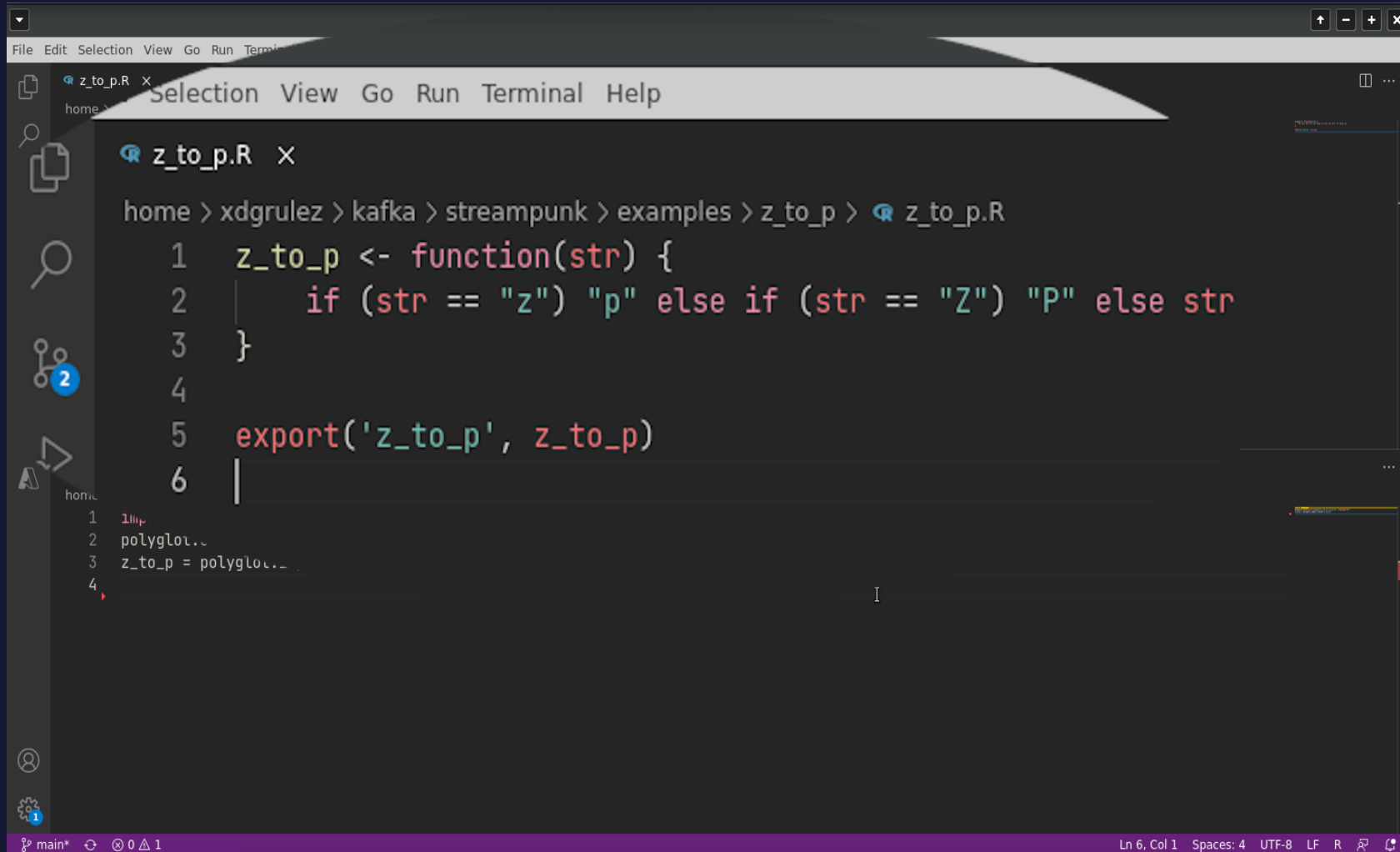
Transform Zs to Ps



Transform Zs to Ps



Streampunk in Action



The screenshot shows the RStudio IDE interface. The main editor window displays the script 'z_to_p.R' with the following R code:

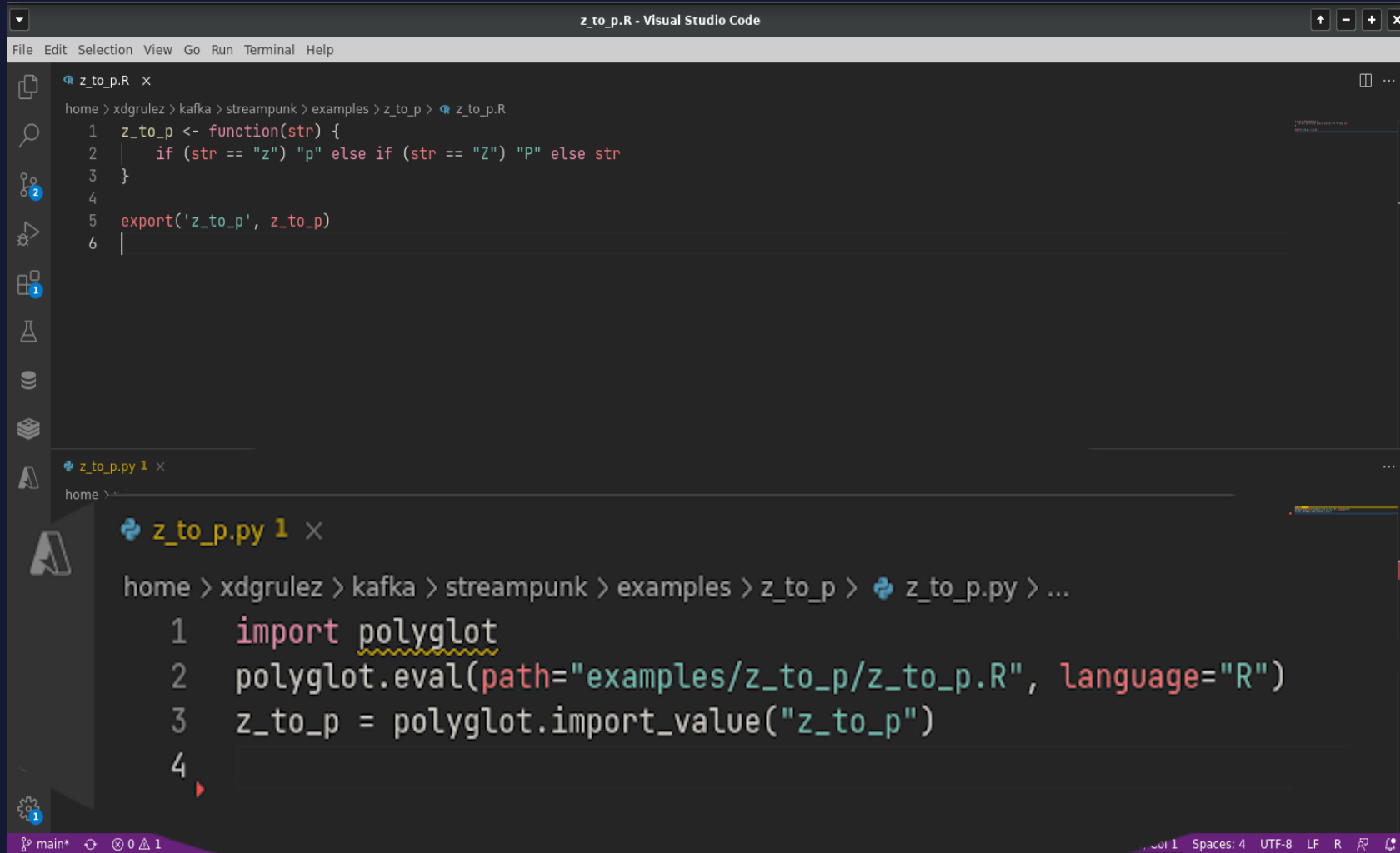
```
home > xdgrulez > kafka > streampunk > examples > z_to_p > z_to_p.R  
1  z_to_p <- function(str) {  
2    if (str == "z") "p" else if (str == "Z") "P" else str  
3  }  
4  
5  export('z_to_p', z_to_p)  
6  |
```

The left sidebar shows the file explorer with the following structure:

- home
 - 1. Rproj
 - 2. polyglot...
 - 3. z_to_p = polyglot...
 - 4. ,

The status bar at the bottom indicates the current file is 'main*', the cursor is at line 6, column 1, and the encoding is UTF-8.

Streampunk in Action



The screenshot shows the Visual Studio Code interface with two files open. The top file, `z_to_p.R`, contains an R function that converts 'z' to 'p' and 'Z' to 'P'. The bottom file, `z_to_p.py`, uses the `polyglot` library to load and execute the R function. The status bar at the bottom indicates the current file is `main*` with 0 errors and 1 warning.

```
z_to_p.R
home > xdgrulez > kafka > streampunk > examples > z_to_p > z_to_p.R
1 z_to_p <- function(str) {
2   if (str == "z") "p" else if (str == "Z") "P" else str
3 }
4
5 export('z_to_p', z_to_p)
6

z_to_p.py
home > xdgrulez > kafka > streampunk > examples > z_to_p > z_to_p.py > ...
1 import polyglot
2 polyglot.eval(path="examples/z_to_p/z_to_p.R", language="R")
3 z_to_p = polyglot.import_value("z_to_p")
4
```

Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Key: null
Value: z

Topic: input, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
>>> █
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Key: null
Value: z

Topic: input, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
>>> Replicate.copyString("local", "local", "input", "output", z_to_p)
```



Streampunk in Action


```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help

Key: null
Value: z

Topic: input, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
>>> Replicate.copyString("local", "local", "input", "output", z_to_p)
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
>>> Replicate.copyString("local", "local", "input", "output", z_to_p)
replicateTopics() local/local, input/output
replicateTopicContents() local/input, local/output
Topic: input, partition: 0, offset: 0/6
local/input/0 0 -> local/output/0
None
>>> █
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Value: z

Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
>>> Replicate.copyString("local", "local", "input", "output", z_to_p)
replicateTopics() local/local, input/output
replicateTopicContents() local/input, local/output
Topic: input, partition: 0, offset: 0/6
local/input/0 0 -> local/output/0
None
>>> Topic.list("local")
```

Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
>>> Replicate.copyString("local", "local", "input", "output", z_to_p)
replicateTopics() local/local, input/output
replicateTopicContents() local/input, local/output
Topic: input, partition: 0, offset: 0/6
local/input/0 0 -> local/output/0
None
>>> Topic.list("local")
['input', 'output']
>>> 
```

Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Topic: input, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: z

Continue (Y/n)? n
None
>>>
>>> from examples.z_to_p.z_to_p import *
>>> Replicate.copyString("local", "local", "input", "output", z_to_p)
replicateTopics() local/local, input/output
replicateTopicContents() local/input, local/output
Topic: input, partition: 0, offset: 0/6
local/input/0 0 -> local/output/0
None
>>> Topic.list("local")
['input', 'output']
>>> ConsumerString.consume("local", "output", "test", None)
```

Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
>>> ConsumerString.consume("local", "output", "test", None)

Topic: output, Partition: 0, Offset: 0, Timestamp: 2022-04-22 13:24:12.505
Headers:
Key: null
Value: p

Topic: output, Partition: 0, Offset: 1, Timestamp: 2022-04-22 13:24:28.121
Headers:
Key: null
Value: p

Topic: output, Partition: 0, Offset: 2, Timestamp: 2022-04-22 13:24:40.178
Headers:
Key: null
Value: p

Continue (Y/n)? █
```



Streampunk in Action

```
Terminal - (focal)xdgrulez@localhost: ~/kafka/streampunk
File Edit View Terminal Tabs Help
Continue (Y/n)?

Topic: output, Partition: 0, Offset: 3, Timestamp: 2022-04-22 13:24:52.781
Headers:
Key: null
Value: p

Topic: output, Partition: 0, Offset: 4, Timestamp: 2022-04-22 13:25:08.769
Headers:
Key: null
Value: p

Topic: output, Partition: 0, Offset: 5, Timestamp: 2022-04-22 13:25:21.998
Headers:
Key: null
Value: p

Continue (Y/n)?
```





The Difference Engine for Unlocking the Kafka Black Box

<https://github.com/xdgrulez/streampunk>



Become a contributor!

<https://github.com/xdgrulez/streampunk>



The Difference Engine for Unlocking the Kafka Black Box

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