Ops4J

Ops4J is an embeddable JVM based JSON processing pipeline which integrates seamlessly into a diverse set of platforms such as any platform where the JVM runs. It also integrates seamlessly into any `bash` shell, allowing OPS4J operations to present themselves as native CLI tooling.

With Ops4J we can:

> Generate massive amounts of synthetic data:

```
map -D 1000000 /=gen-person: > people.json
```

> with benchmarking:

```
# Make 1 million people
map -D 1000000 /=gen-person: | benchmark > people.json
```

> we can explore data:

The http-server is an extensible server which hosts a number of powerful data exploration applications.

```
cat data.json | http-server
cat data.csv | http-server -D csv:stdin:
mongo-stream -d my_db -c my_collection | http-server
```

> we can persist useful views of data.

```
cat data.json | groovy-template
```

> we can ask questions of AI without all the barriers.

You'll start using AI more often once it becomes ubiquitous.

```
# Just ask chat-gpt a question:
ask 'please explain why the sky is blue.'

# Ask a different ai:
ask -C AI.GITHUB -m GITHUB -gh meta-llama-3-70b-instruct \
  'please explain why the sky is blue.'
```

> we can create our own prompts.

```
# Prompts give you better results with less effort:
prompt -p novice.pr 'please explain why...'
prompt -p expert.pr 'please explain why...'
prompt -p writeop.pr 'please write an operation that...'
prompt -p nodeop.pr 'please write a node operation that...'
```

> Inspect images:

```
query-image <image> 'what do you see in this image?'

# Repetitive task of image name suggestion.
query-image <image> 'what should I call this image?' \
  'Limit it to 30 characters and make it easy to remember.'

# Same as the previous example:
# 'suggest-name.pr' contains the 0 arg prompt.
query-image <image> -p suggest-name.pr
```

> Create new images.

```
gen-image 'an eagle flying high in the sky next to a monarch butterfly.'
```

> Reading data from different places feels the same.

```
mongo-stream -d mydb -c contacts > contacts.json
jdbc-stream -d mydb 'select * from contacts' > contacts.json
```

Installation

Post-Installation

Once installed, we are connected to our tooling via the `ops` command:

```
# Give help on how to use ops4j
ops -h
```

where we see we can get a table of contents of commands:

```
# Get a table of contents for ops4j
ops toc
```

which gives us an inventory of everything our ops4j installation can do.

```
------------------------------------------------------------
--                        OPERATIONS                      --
------------------------------------------------------------
ask                backlog            bash-exec          bash-filter
bash-source        benchmark          disruptor          draw
filter             flatten            gen-image          groovy-template
http-client        http-get           http-server        http-view
jdbc-create        jdbc-drop          jdbc-insert        jdbc-stream
jhead              logphases          logtest            map
model-usl          mongo-insert       mongo-stream       noop
op-info            pause              pipeline           poe
print              prompt             query-image        rag
remove-nulls       route              shell              shuffle
simulate           smile-cluster      sort               stream
stream-lines       tail               unwind             viz-flow
viz-sequence       viz-tree           vw                 web-view
wss                xray
```

Our native shell is now extended with these additional operations. Better yet, we can write our own if we desire.

Examples

Dr. Who

Suppose we are interested in Dr. Who. And who isn't? Using curl, we can download the sample drwho.csv dataset.

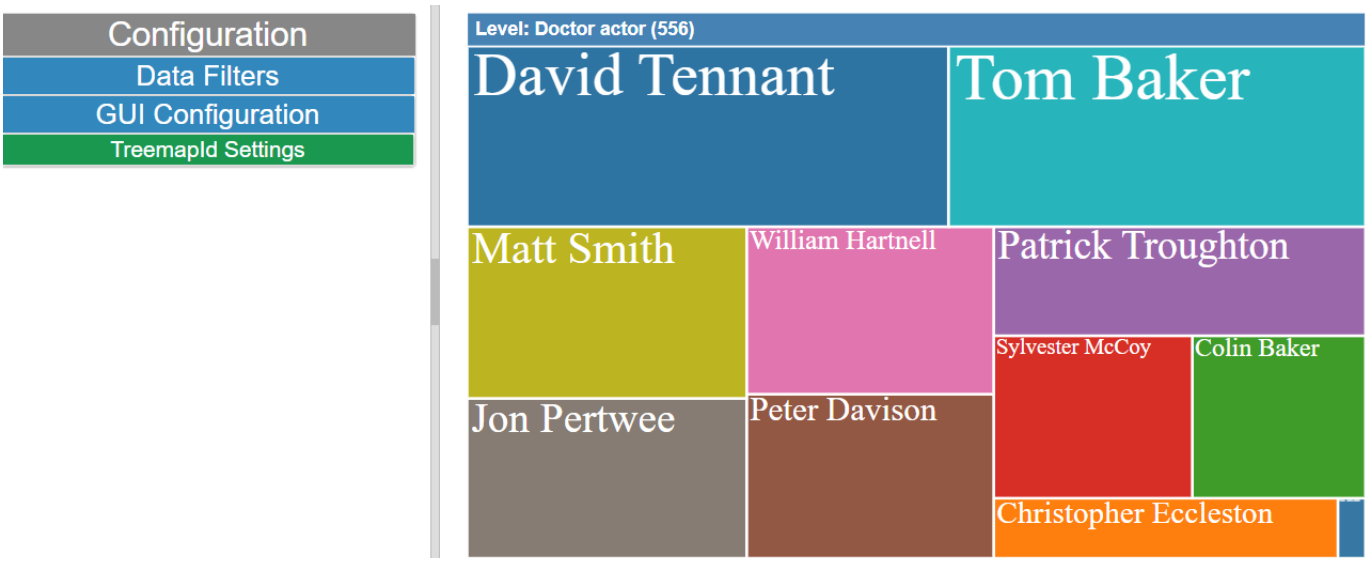
```
curl -k
https://raw.githubusercontent.com/PatMartin/Dex/refs/heads/master/data/drwho.csv >
drwho.csv
```

Now that we have the data, we can quickly explore via the our `http-server` operation. Here we run it using the CSV we just downloaded as its input.

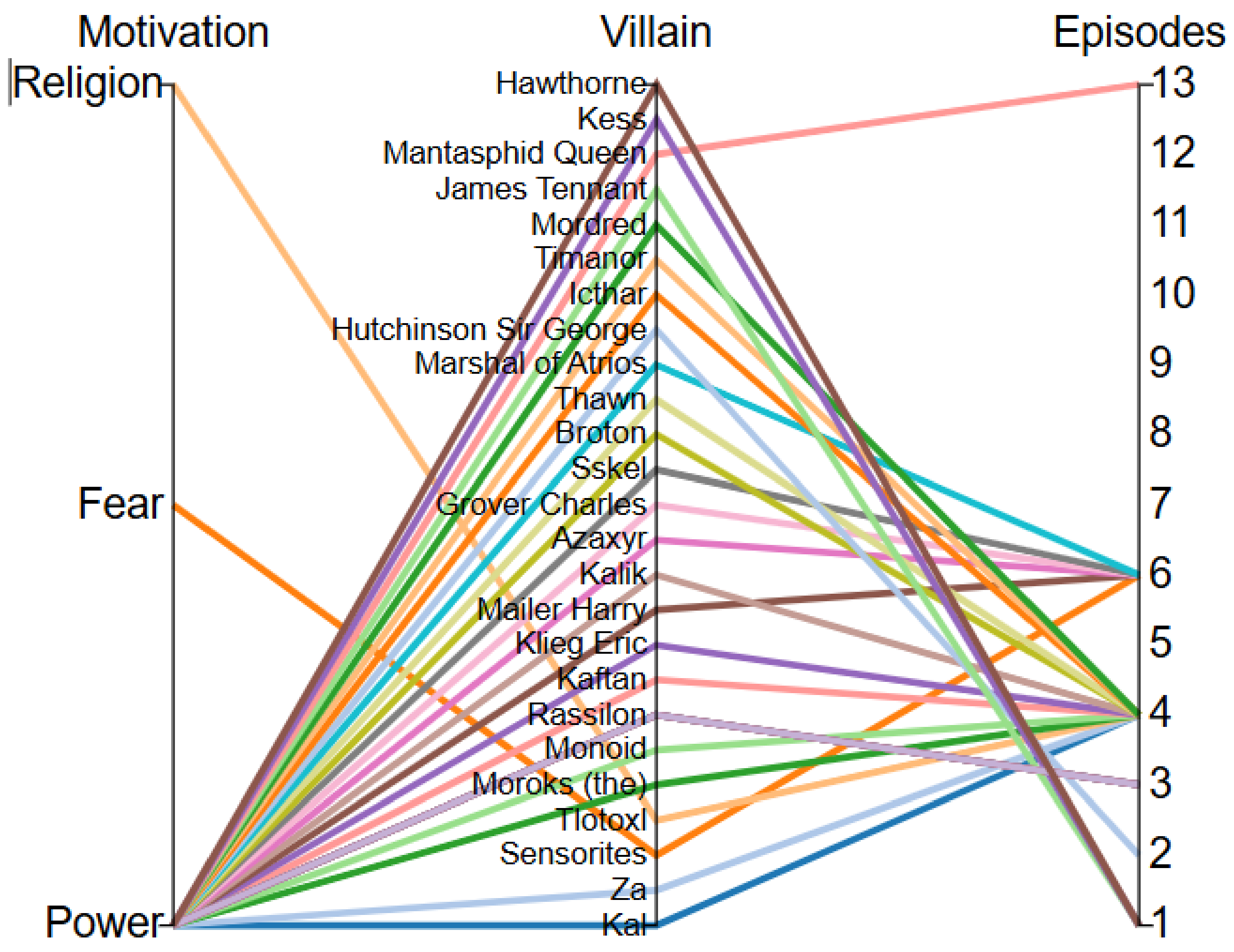
```
# Read it via the read-csv operation feeding http-server
read-csv drwho.csv | http-server

# Or we can just read it directly
http-server -D csv:http-server
```

Now we can take a quick look at the data via the http-server operation within Ops4J. By default, this server will run at http://localhost:4242/index.html unless configured otherwise. The server hosts set of visualization applications and other complimentary applications which allow us to quickly get to interactive views such as:



or quickly delve into visual analysis such as villain motiviation:



```
$ map -D 2 /name=gen-name: /phone=gen-phone:

{"name":"Gertrude Vandervort","phone":"1-549-867-5917"}
{"name":"Angeline Bins","phone":"032-454-6283 x5961"}
```

Introduction

Operations

Operations provide single purpose utilities which can be combined in pipelines to accomplish more complex task. This section will document each of these utilities/operations.

backlog

> Service a backlog of task concurrently.

usage:

```
backlog [-C=<view>] [-iqt=<inputQueueType>] [-L=<logLevel>]
               [-max=<maxThreads>] [-min=<minThreads>] [-N=<name>]
               [-oqt=<outputQueueType>] <commands>

Run operations using a backlog feeding concurrent workers.

Additional CLI Options: [-hHP] [-D=<dataSource>] [-O=<outputType>]
                         [-S=<serializationType>] [-LL=<String=LogLevel>]...
```

help:

```
backlog -H
Usage: backlog [-C=<view>] [-iqt=<inputQueueType>] [-L=<logLevel>]
               [-max=<maxThreads>] [-min=<minThreads>] [-N=<name>]
               [-oqt=<outputQueueType>] <commands>

Run operations using a backlog feeding concurrent workers.

      <commands>          The commands to be executed.

      -iqt, --input-queue-type=<inputQueueType>
                          The input queue type.
      -max, --max-threads=<maxThreads>
                          The maximum number of threads.
      -min, --min-threads=<minThreads>
                          The minimum number of threads.
      -oqt, --output-queue-type=<outputQueueType>
                          The output queue type.

Class: org.ops4j.op.Backlog
```

examples:

```
# Insert example here...
```

bash-exec

> Execute a bash script.

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

bash-filter

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

bash-source

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

benchmark

> Benchmark something.

usage:

```
Usage: benchmark [<transactionThreshold>]

Benchmark something.
```

help:

```
benchmark [<transactionThreshold>]

Benchmark something.

      [<transactionThreshold>]
                           The number of transactions between reports.  Default =
                             0 = No progress reports

Class: org.ops4j.op.Benchmark
```

examples:

```
# Benchmark the creation of 100,000 people records.
map -D 100000 /=gen-person: | benchmark 10000 -O none
```

disruptor

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

filter

> Filter a stream based upon inclusion and exclusion conditions.

usage:

```
Usage: filter [-i=<includes>] [-x=<excludes>]

Filter records.
```

help:

```
filter [-i=<includes>] [-x=<excludes>]

Filter records.

  -i, --includes=<includes>
                           The includes.
  -x, --excludes=<excludes>
                           The excludes.

Class: org.ops4j.op.Filter
```

examples:

```
# Generate 100 people, keeping only females
map -D 100 /=gen-person: | \
  filter -i 'match(/sex -pattern="Female")'

# Generate 100 people, discarding females
map -D 100 /=gen-person: | \
  filter -x 'match(/sex -pattern="Female")'

# Generate 100 people, filter on Asian Females
map -D 100 /=gen-person: | \
  filter -i 'match(/sex -pattern="Female")' \
    -i 'match(/race -pattern="Asian")'
```

flatten

> Flatten a structured payload.

usage:

```
flatten

Flatten a nested JSON.
```

help:

```
flatten

Flatten a nested JSON.

Class: org.ops4j.op.Flatten
```

examples:

```
echo '{"student":{"name":"bob", "grades":[90,100]}}' | flatten
```

groovy-template

> Render a groovy template.

usage:

```
Usage: groovy-template [-C=<view>] [-L=<logLevel>] [-N=<name>]
                       [-t=<templatePath>]

Render a Groovy template.
```

help:

```
Usage: groovy-template [-C=<view>] [-L=<logLevel>] [-N=<name>]
                       [-t=<templatePath>]

Render a Groovy template.

  -t, --template=<templatePath>
                         The template.

Class: org.ops4j.groovy.op.GroovyTemplate
```

examples:

```
cat data.json | groovy-template tps-report.gt
```

http-client

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

http-get

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

http-server

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

http-view

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

jdbc-create

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

jdbc-drop

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

jdbc-insert

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

jdbc-stream

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

jhead

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

logphases

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

logtest

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

map

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

model-usl

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

mongo-insert

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

mongo-stream

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

noop

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

op-info

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

pause

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

pipeline

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

poe

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

print

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

remove-nulls

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

route

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

shell

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

shuffle

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

simulate

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

smile:cluster

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

sort

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

stream

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

stream:lines

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

tail

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

unwind

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

viz-flow

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

viz-sequence

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

viz-tree

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

vw

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

web-view

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

wss

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

xray

> Short description

usage:

```
# USAGE
```

help:

```
# HELP
```

examples:

```
# EXAMPLE
```

Node Operations

array

```
map -D 1 /=gen-person: | map '/data=array(/first /last /age)'
```

array-add

broken

avg

```
map -D 10 /n=int: | map /=/ /avg=avg:/n
map -D 10 /n=int: | map /=/ /avg='avg(/n)'
```

choose

```
map -D 10 /c='choose(a b c)'
```

cos

```
map -D 10 /n=seq: | map /=/ /cos='cos(/n)'
```

decrypt

```
echo '{"msg":"hello world!"}' | map /enc=encrypt:/
{"enc":"+ql7yKVgXJgZqgDCXh8aGI4h5uBfmnTwK5BhvpM2XhA="}

echo '{"enc":"+ql7yKVgXJgZqgDCXh8aGI4h5uBfmnTwK5BhvpM2XhA="}' | \
  map /=decrypt:/enc   {"msg":"hello world!"}
{"msg":"hello world!"}
```

dist

This node operation can be used to generate various distributions.

```
# Generate a uniform distribution from 0 to 100 with precision of 2
map -D 100 '/uniform=dist(-uniform -min=0 -max=100 -precision=2)'

# generate 100 records with a normal distribution with a
# mean of 10 and standard deviation of 5
map -D 100 '/normal=dist(-normal -mean=10 -variance=5)'

# Generate a tseries with 10 values and 9 degrees of freedom.
map -D 10 '/tseries=dist(-tseries -freedom=9)'

# Generate a logistic series with peak mu and scaling factor s
map -D 100 '/logistic=dist(-logistic -s=1 -mu=10)'
```

double

Generate random doubles.

```
map -D 1 /d=double:

map -D 10 /score='double(-min=1.0 -max=100.0 -precision 2)'
```

encrypt

```
echo '{"msg":"hello world!"}' | map /enc=encrypt:/
{"enc":"+ql7yKVgXJgZqgDCXh8aGI4h5uBfmnTwK5BhvpM2XhA="}

echo '{"enc":"+ql7yKVgXJgZqgDCXh8aGI4h5uBfmnTwK5BhvpM2XhA="}' | \
  map /=decrypt:/enc   {"msg":"hello world!"}
{"msg":"hello world!"}
```

eval

```
echo '{"x":1,"y":2}' | \
  map /=/ '/result=eval(-x="return x+y")'
```

gen-address

```
map -D 1 /address=gen-address:
```

gen-city

```
map -D 1 /city=gen-city:
```

gen-code

```
map -D 1 /code=gen-code:
```

gen-data

```
map -D 1 /data=gen-data:
```

gen-date

```
map -D 1 /date=gen-date:
```

gen-first

```
map -D 1 /first=gen-first:
```

gen-int-array

```
map -D 1 /array=gen-int-array:
# Generate even numbers from 2-100
map -D 1 '/array=gen-int-array(-s=2 -e=100 -i=2)'
```

gen-key

Generate a cryptographic key.

```
map -D 1 /key=gen-key:
```

gen-last

```
map -D 1 /last=gen-last:
```

gen-lat-long

```
map -D 1 /coordinates=gen-lat-long:
```

gen-name

```
map -D 1 /name=gen-name:
```

gen-person

```
map -D 1 /person=gen-person:
```

gen-phone

```
map -D 1 /phone=gen-phone:
```

gen-state

```
map -D 1 /state=gen-state:
```

gen-text

```
map -D 1 /text=gen-text:
map -D 1 /text='gen-text(-p=###-@@-####)'
```

int

```
map -D 1 /i=int:
map -D 1 /i='int()'
map -D 1 '/i='int()
```

jpath

```
map -D 1 /=gen-person: | map /name='jpath($.last)'
```

keywords

```
stream-lines book.txt | map /keywords=keywords:/lines
```

match

```
echo '{"name":"bob"}' | map /match='match(/name -pattern=bo)'
```

min

```
map -D 10 /n=int: | map /=/ /min=min:/n
```

missing

Generate a missing or null JSON node.

```
map -D 1 /missingValue=missing:
```

normalize

```
stream-lines book.txt | map /n=normalize:/lines
```

now

```
map -D 1 \
  /now=now: \
  /yesterday='now(-offset=-86400000)' \
  /tomorrow='now(-offset=86400000)'
```

null

```
map -D 1 /empty=null:
```

pct

```
map -D 100 /i=int: | map /=/ /pct='pct(/i -p 20 -w 10)'
```

plus

```
map -D 1 /=DELETEME:
map -D 1 /='DELETEME()'
```

random-text

```
map -D 1 /text=random-text:
map -D 5 /text='random-text(-min=10 -max=10)'
map -D 10 /matrix='random-text(-charset=01 -min=10 -max=10)'
```

run

```
map -D 1 /=DELETEME:
map -D 1 /='DELETEME()'
```

sentences

```
stream-lines book.txt | map /s=sentences:/lines
```

seq

```
map -D 100 /n=seq:
```

sin

```
map -D 10 /n=seq: | map /=/ /sin='sin(/n)'
```

slope

```
map -D 10 /i=int: | map /=/ /slope=slope:/i
```

split

```
echo '{"names":"jim,john,sue,bob"}' | map /n=split:/names
```

text

```
map -D 1 /message='text("hello world")'
```

to-double

```
echo '{"msg":"123.456"}' | map /d=to-double:/msg
```

to-float

```
echo '{"msg":"123.456"}' | map /f=to-float:/msg
```

to-int

```
echo '{"msg":"123"}' | map /i=to-int:/msg
```

to-lower

```
echo '{"msg":"HELLO WORLD"}' | map /msg=to-lower:/msg
```

to-month

```
map -D 10 /i=int: | map /month=to-month:/i
```

to-string

```
echo '{"pi":3.14}' | map /pi=to-string:/pi
```

to-upper

```
map -D 10 /=gen-person: | map /NAME=to-upper:/first
```

words

```
stream-lines book.txt | map /words=words:/
```