

Correlating JVM Threads to System Resources



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System Resources

CPU

Memory

Disk I/O

File Descriptors

TCP Connections

Overview

Gathering Thread CPU and Memory Utilization

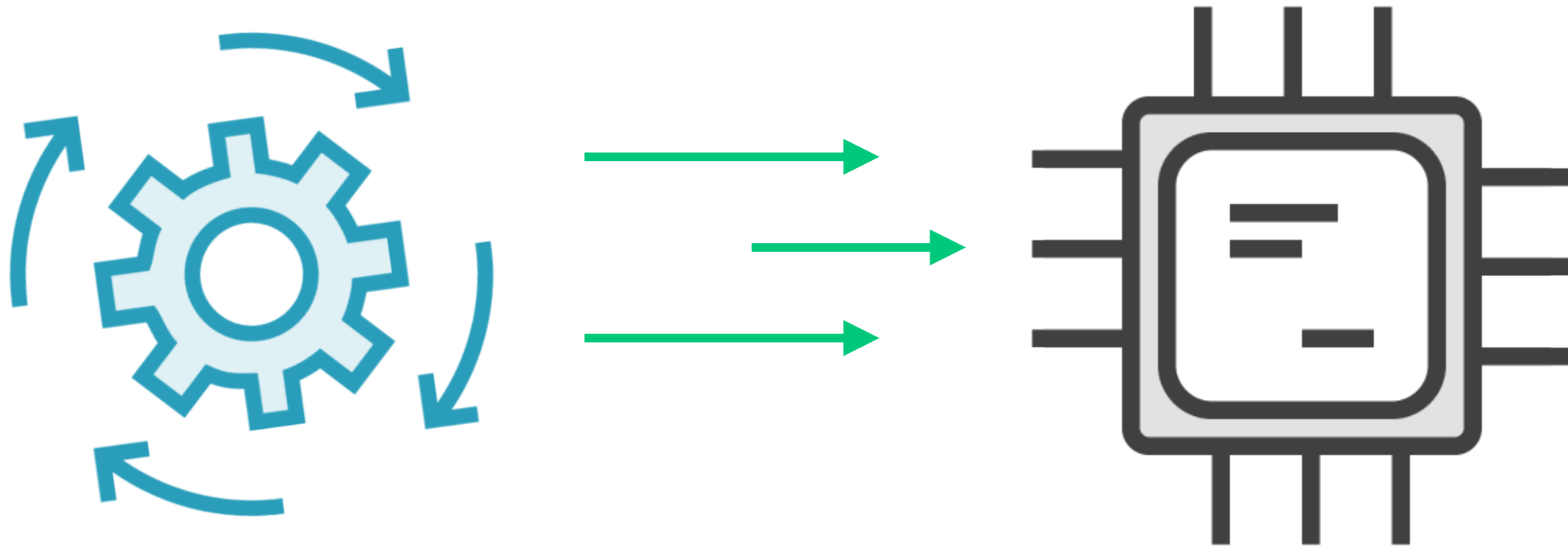
How I/O-bound a Thread Is

File Descriptors - Filesystem Handles

File Descriptors - TCP Connections

Thread CPU and Memory Utilization

CPU-bound Threads



Catastrophic Backtracking

<https://www.regular-expressions.info/catastrophic.html>

The Entire Debugging Chain

```
1  #! /bin/bash
2
3  java -jar catastrophic-backtracker.jar 100000 12 | ./nid-4
4  translator.pl > thread-dumps-w-decimal-nids.out &
5
6  sh dump-threads.sh 10 &

+  top -d 0.1 -H -p $pid (manual step)
```


1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

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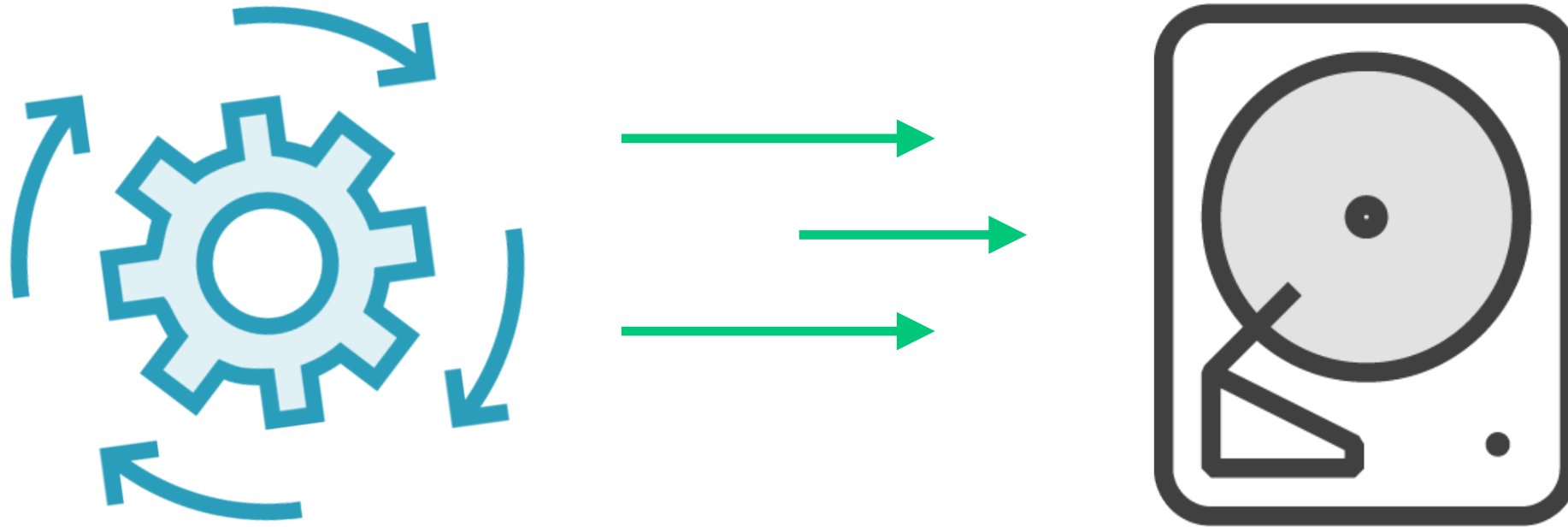
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1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, **P12**, 13, 14, 15, 16, 17, 18, 19, 20

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Finding How I/O-bound a Thread Is

I/O-bound Threads

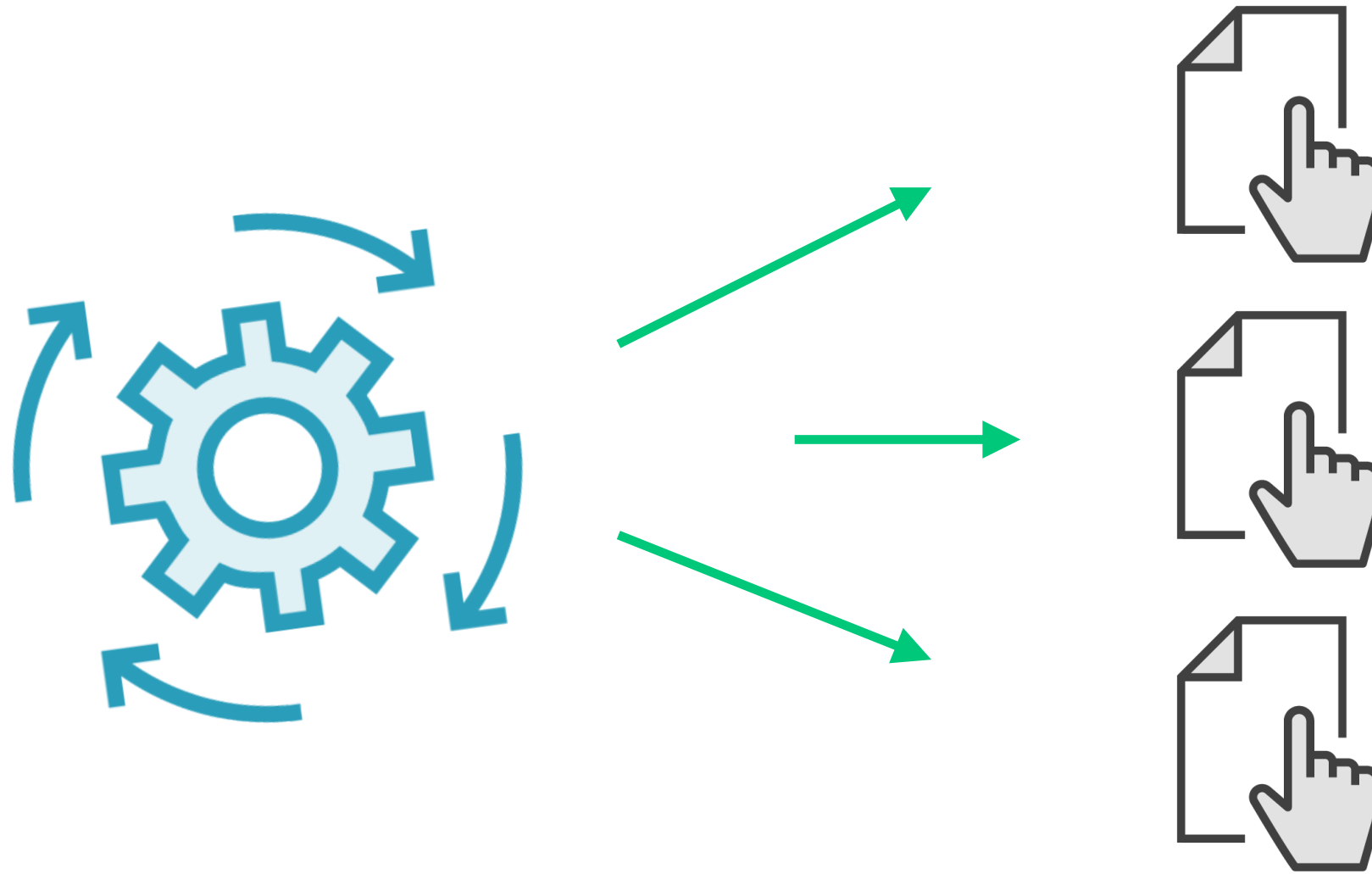


The Entire Debugging Chain

```
1  #! /bin/bash
2
3  java -jar fs-operator.jar write 2 | ./nid-
4  translator.pl > thread-dumps-w-decimal-nids.out &
5
6  sh dump-threads.sh 10 &
7
8  ps aux | grep [j]ava | awk '{print $2}' | xargs strace -o
9  fs-operator -tt -T -ff -p
```

File Descriptors - Filesystem Handles

File Descriptor Access

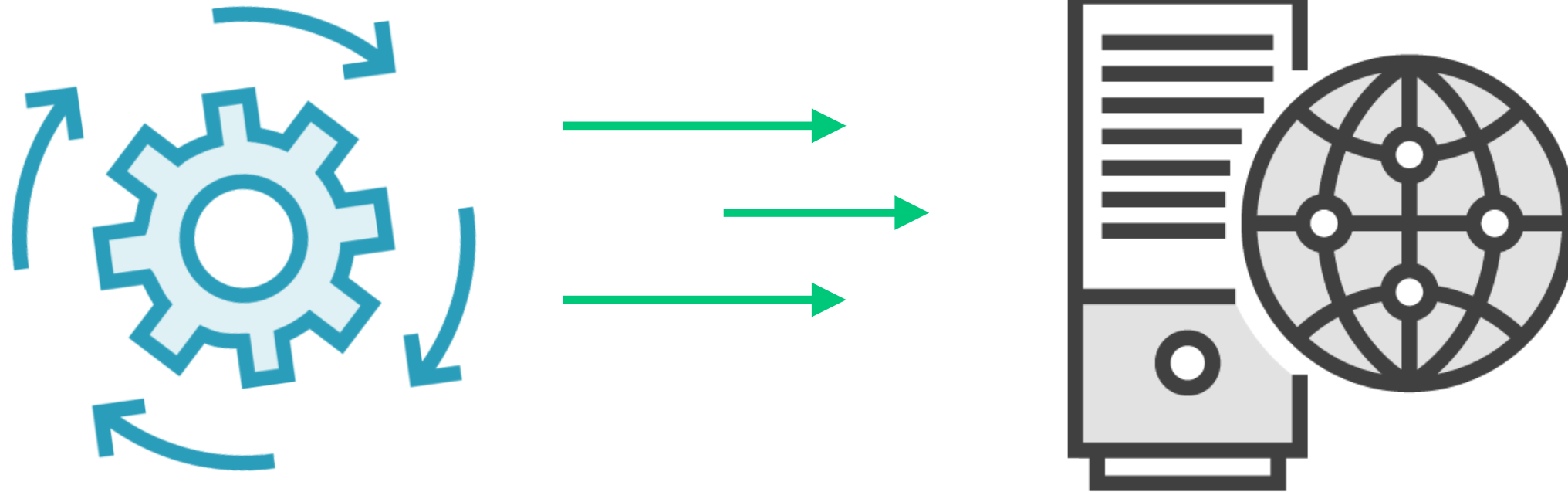


The Entire Debugging Chain

```
1  #!/bin/bash
2
3  java -jar fs-operator.jar read 5 | ./nid-
4  translator.pl > thread-dumps-w-decimal-nids.out &
5
6  sh dump-threads.sh 10 &
7
8  ps aux | grep [j]ava | awk '{print $2}' | xargs strace -o
9  fs-operator -tt -T -ff -p
```

Finding Thread TCP Connections

TCP Connections



The Entire Debugging Chain

```
1  #! /bin/bash
2
3  java -jar bearer-authenticator.jar | ./nid-
4  translator.pl > thread-dumps-w-decimal-nids.out &
5
6  sh dump-threads.sh 10 &
7
8  ps aux | grep [j]ava | awk '{print $2}' | xargs strace -o
9  fs-operator -ff -e trace=network -tt -T -p
```

Thank you :-)