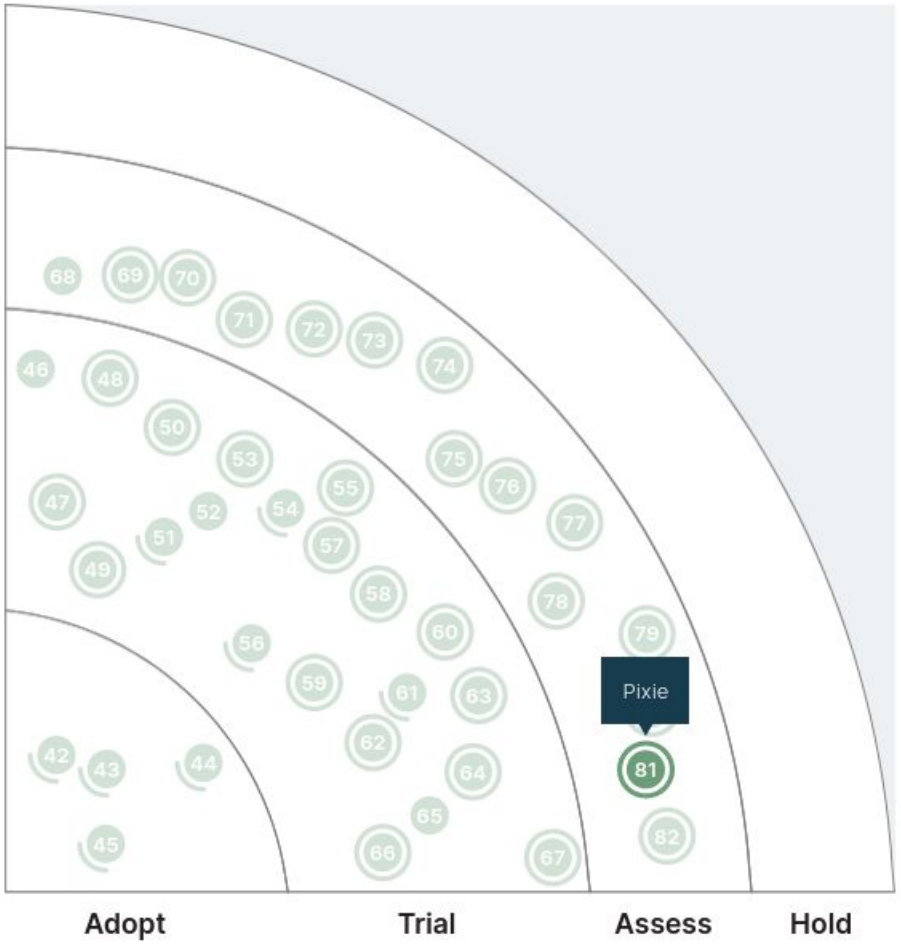
Pixie

Get behind-the-scenes insight into how your apps are working

81. Pixie

Pixie is an observability tool for Kubernetes native applications. It takes an interesting approach toward observability by leveraging eBPF to automatically collect telemetry data from multiple data sources. Collected telemetry data is stored locally in each node and processed centrally via its control plane API. Overall, we find Pixie worthwhile to assess for observability in the Kubernetes ecosystem.

View blip history



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Pixie is an observability tool for Kubernetes native applications. It takes an interesting approach toward observability by leveraging eBPF to automatically collect telemetry data from multiple data sources. Collected telemetry data is stored locally in each node and processed centrally via its control plane API. Overall, we find Pixie worthwhile to assess for observability in the Kubernetes ecosystem.

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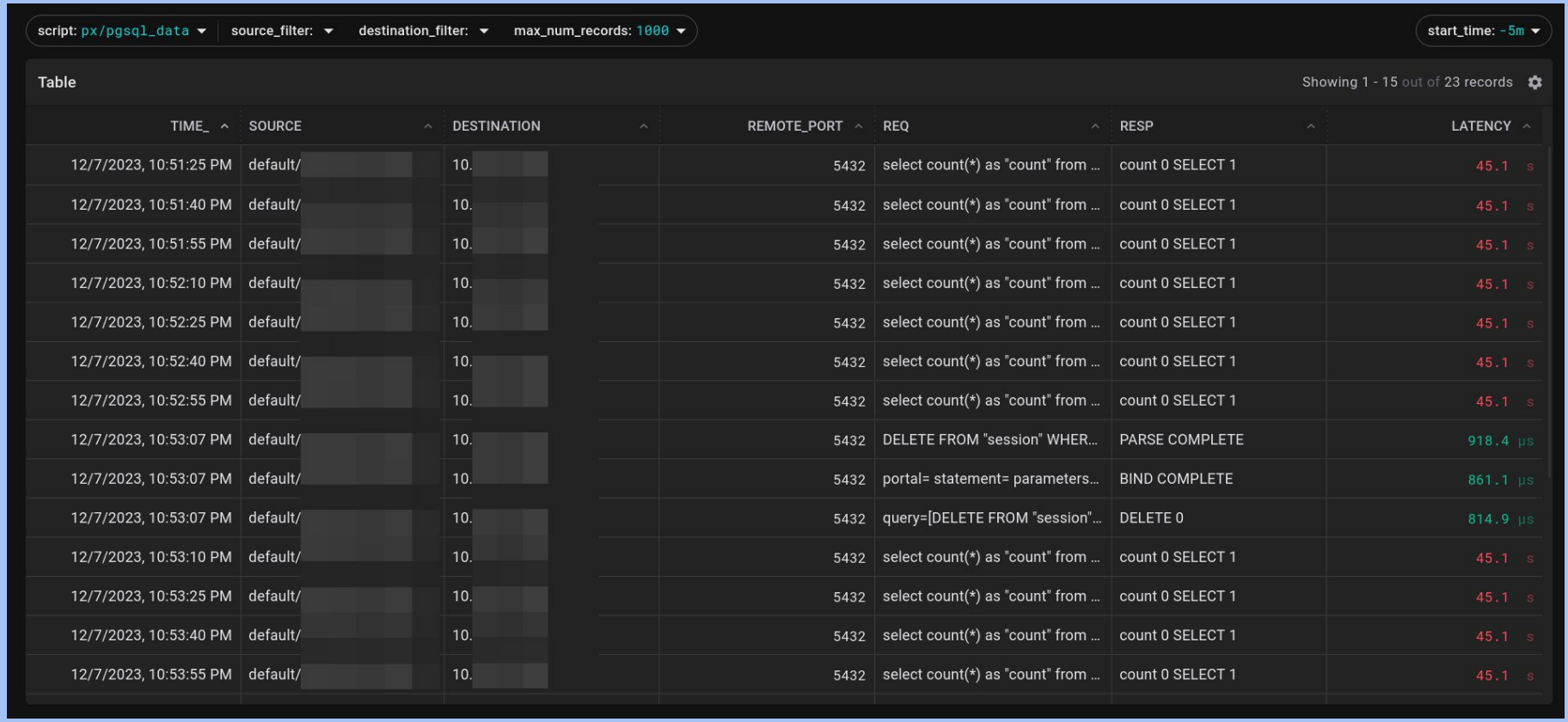
Kubernetes: a platform to run containers across multiple servers, with lots of other bells and whistles

eBPF: a way to run custom code in the kernel space, meaning that code will be able to intercept anything that happens in any running program

multiple data sources: meaning things like network packets, JVM metrics, cpu + memory metrics

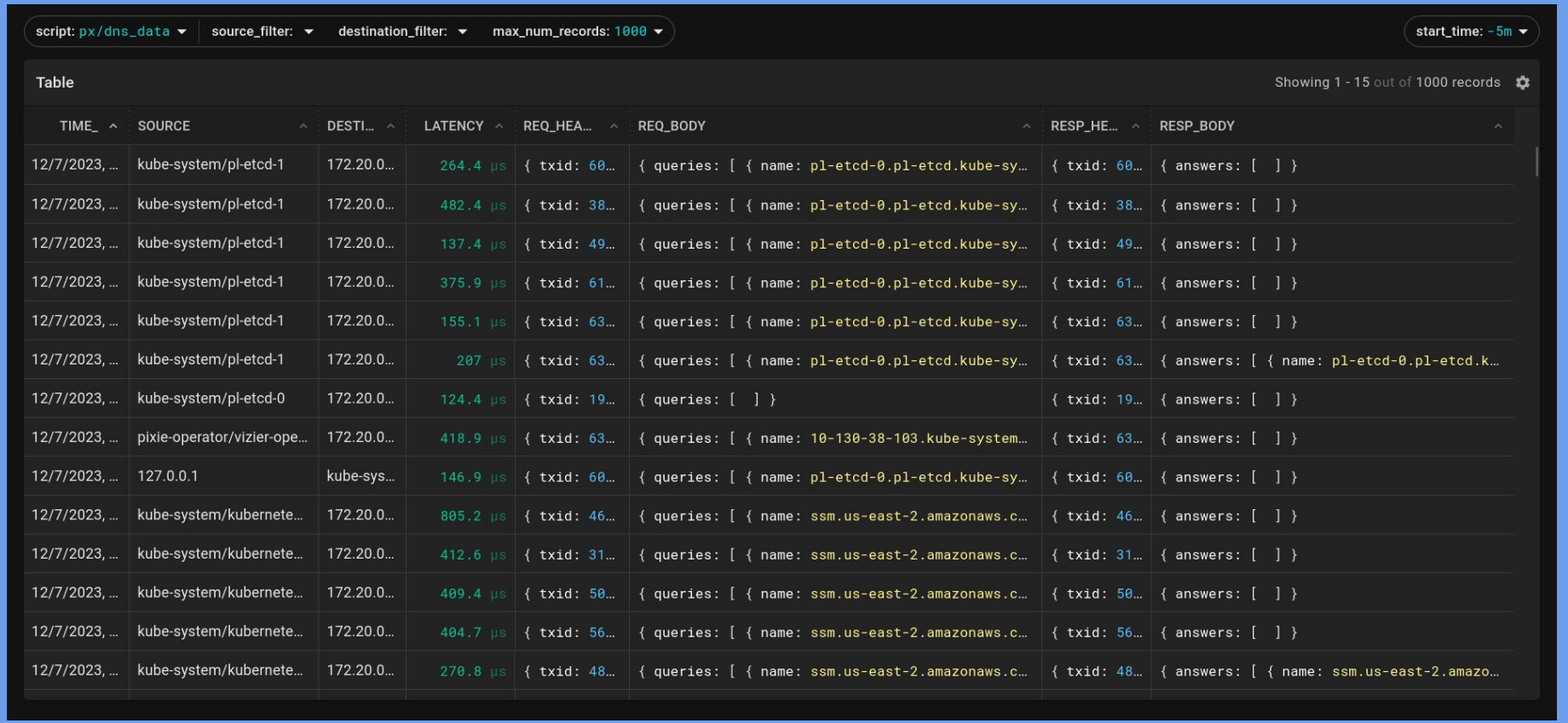
So what can we see?

Postgres traffic (the actual queries)



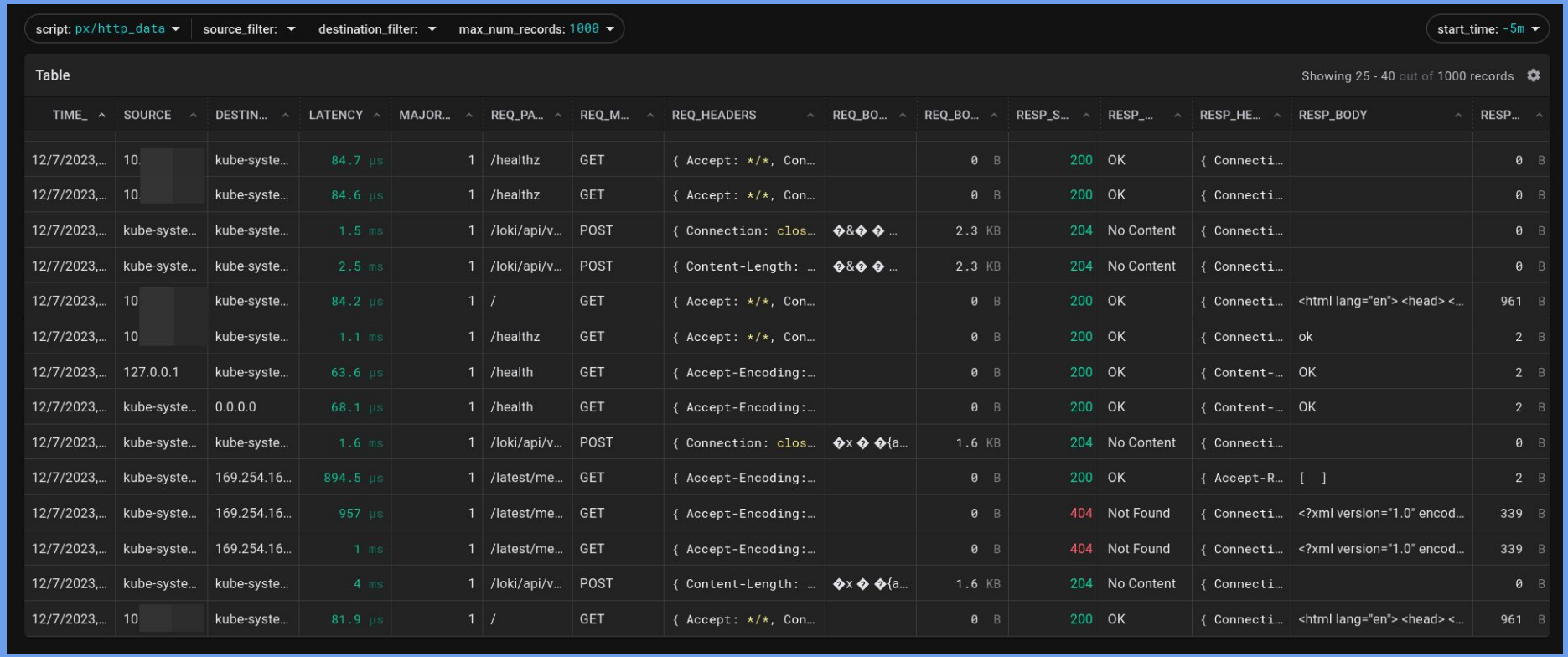
TIME_	SOURCE	DESTINATION	REMOTE_PORT	REQ	RESP	LATENCY
12/7/2023, 10:51:25 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:51:40 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:51:55 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:52:10 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:52:25 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:52:40 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:52:55 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:53:07 PM	default/	10.	5432	DELETE FROM "session" WHER...	PARSE COMPLETE	918.4 µs
12/7/2023, 10:53:07 PM	default/	10.	5432	portal= statement= parameters...	BIND COMPLETE	861.1 µs
12/7/2023, 10:53:07 PM	default/	10.	5432	query=[DELETE FROM "session"...	DELETE 0	814.9 µs
12/7/2023, 10:53:10 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:53:25 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:53:40 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s
12/7/2023, 10:53:55 PM	default/	10.	5432	select count(*) as "count" from ...	count 0 SELECT 1	45.1 s

DNS queries



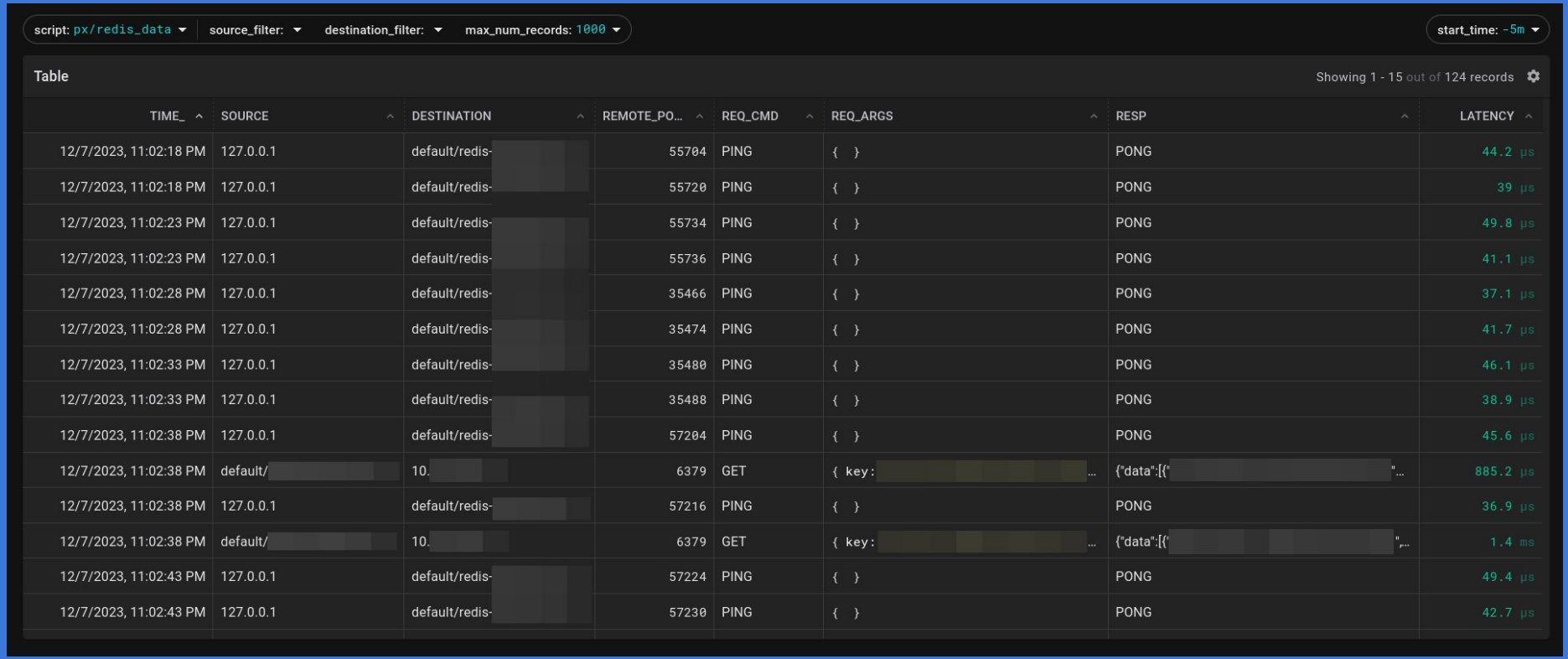
TIME_	SOURCE	DESTI...	LATENCY	REQ_HEA...	REQ_BODY	RESP_HE...	RESP_BODY
12/7/2023, ...	kube-system/pl-etcd-1	172.20.0...	264.4 µs	{ txid: 60...	{ queries: [{ name: pl-etcd-0.pl-etcd.kube-sy...	{ txid: 60...	{ answers: [ ] }
12/7/2023, ...	kube-system/pl-etcd-1	172.20.0...	482.4 µs	{ txid: 38...	{ queries: [{ name: pl-etcd-0.pl-etcd.kube-sy...	{ txid: 38...	{ answers: [ ] }
12/7/2023, ...	kube-system/pl-etcd-1	172.20.0...	137.4 µs	{ txid: 49...	{ queries: [{ name: pl-etcd-0.pl-etcd.kube-sy...	{ txid: 49...	{ answers: [ ] }
12/7/2023, ...	kube-system/pl-etcd-1	172.20.0...	375.9 µs	{ txid: 61...	{ queries: [{ name: pl-etcd-0.pl-etcd.kube-sy...	{ txid: 61...	{ answers: [ ] }
12/7/2023, ...	kube-system/pl-etcd-1	172.20.0...	155.1 µs	{ txid: 63...	{ queries: [{ name: pl-etcd-0.pl-etcd.kube-sy...	{ txid: 63...	{ answers: [ ] }
12/7/2023, ...	kube-system/pl-etcd-1	172.20.0...	207 µs	{ txid: 63...	{ queries: [{ name: pl-etcd-0.pl-etcd.kube-sy...	{ txid: 63...	{ answers: [{ name: pl-etcd-0.pl-etcd.k...
12/7/2023, ...	kube-system/pl-etcd-0	172.20.0...	124.4 µs	{ txid: 19...	{ queries: [ ] }	{ txid: 19...	{ answers: [ ] }
12/7/2023, ...	pixie-operator/vizier-ope...	172.20.0...	418.9 µs	{ txid: 63...	{ queries: [{ name: 10-130-38-103.kube-system...	{ txid: 63...	{ answers: [ ] }
12/7/2023, ...	127.0.0.1	kube-sys...	146.9 µs	{ txid: 60...	{ queries: [{ name: pl-etcd-0.pl-etcd.kube-sy...	{ txid: 60...	{ answers: [ ] }
12/7/2023, ...	kube-system/kubernete...	172.20.0...	805.2 µs	{ txid: 46...	{ queries: [{ name: ssm.us-east-2.amazonaws.c...	{ txid: 46...	{ answers: [ ] }
12/7/2023, ...	kube-system/kubernete...	172.20.0...	412.6 µs	{ txid: 31...	{ queries: [{ name: ssm.us-east-2.amazonaws.c...	{ txid: 31...	{ answers: [ ] }
12/7/2023, ...	kube-system/kubernete...	172.20.0...	409.4 µs	{ txid: 50...	{ queries: [{ name: ssm.us-east-2.amazonaws.c...	{ txid: 50...	{ answers: [ ] }
12/7/2023, ...	kube-system/kubernete...	172.20.0...	404.7 µs	{ txid: 56...	{ queries: [{ name: ssm.us-east-2.amazonaws.c...	{ txid: 56...	{ answers: [ ] }
12/7/2023, ...	kube-system/kubernete...	172.20.0...	270.8 µs	{ txid: 48...	{ queries: [{ name: ssm.us-east-2.amazonaws.c...	{ txid: 48...	{ answers: [{ name: ssm.us-east-2.amazo...

HTTP traffic



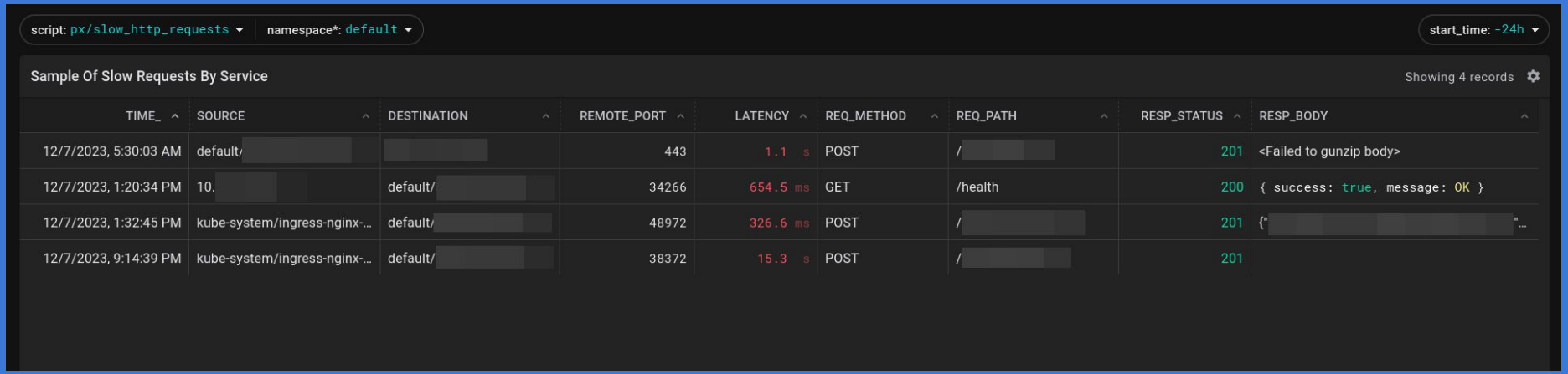
TIME_	SOURCE	DESTIN…	LATENCY	MAJOR…	REQ_PA…	REQ_M…	REQ_HEADERS	REQ_BO…	REQ_BO…	RESP_S…	RESP_…	RESP_HE…	RESP_BODY	RESP…
12/7/2023,…	10	kube-syste…	84.7 µs	1	/healthz	GET	{ Accept: */*, Con…		0 B	200	OK	{ Connecti…		0 B
12/7/2023,…	10	kube-syste…	84.6 µs	1	/healthz	GET	{ Accept: */*, Con…		0 B	200	OK	{ Connecti…		0 B
12/7/2023,…	kube-syste…	kube-syste…	1.5 ms	1	/loki/api/v…	POST	{ Connection: clos…	��&� …	2.3 KB	204	No Content	{ Connecti…		0 B
12/7/2023,…	kube-syste…	kube-syste…	2.5 ms	1	/loki/api/v…	POST	{ Content-Length: …	��&� …	2.3 KB	204	No Content	{ Connecti…		0 B
12/7/2023,…	10	kube-syste…	84.2 µs	1	/	GET	{ Accept: */*, Con…		0 B	200	OK	{ Connecti…	<html lang="en"> <head> <…	961 B
12/7/2023,…	10	kube-syste…	1.1 ms	1	/healthz	GET	{ Accept: */*, Con…		0 B	200	OK	{ Connecti…	ok	2 B
12/7/2023,…	127.0.0.1	kube-syste…	63.6 µs	1	/health	GET	{ Accept-Encoding:…		0 B	200	OK	{ Content-…	OK	2 B
12/7/2023,…	kube-syste…	0.0.0.0	68.1 µs	1	/health	GET	{ Accept-Encoding:…		0 B	200	OK	{ Content-…	OK	2 B
12/7/2023,…	kube-syste…	kube-syste…	1.6 ms	1	/loki/api/v…	POST	{ Connection: clos…	��x ��{a…	1.6 KB	204	No Content	{ Connecti…		0 B
12/7/2023,…	kube-syste…	169.254.16…	894.5 µs	1	/latest/me…	GET	{ Accept-Encoding:…		0 B	200	OK	{ Accept-R…	[ ]	2 B
12/7/2023,…	kube-syste…	169.254.16…	957 µs	1	/latest/me…	GET	{ Accept-Encoding:…		0 B	404	Not Found	{ Connecti…	<?xml version="1.0" encod…	339 B
12/7/2023,…	kube-syste…	169.254.16…	1 ms	1	/latest/me…	GET	{ Accept-Encoding:…		0 B	404	Not Found	{ Connecti…	<?xml version="1.0" encod…	339 B
12/7/2023,…	kube-syste…	kube-syste…	4 ms	1	/loki/api/v…	POST	{ Content-Length: …	��x ��{a…	1.6 KB	204	No Content	{ Connecti…		0 B
12/7/2023,…	10	kube-syste…	81.9 µs	1	/	GET	{ Accept: */*, Con…		0 B	200	OK	{ Connecti…	<html lang="en"> <head> <…	961 B

Redis traffic



TIME_	SOURCE	DESTINATION	REMOTE_PO...	REQ_CMD	REQ_ARGS	RESP	LATENCY
12/7/2023, 11:02:18 PM	127.0.0.1	default/redis-	55704	PING	{ }	PONG	44.2 µs
12/7/2023, 11:02:18 PM	127.0.0.1	default/redis-	55720	PING	{ }	PONG	39 µs
12/7/2023, 11:02:23 PM	127.0.0.1	default/redis-	55734	PING	{ }	PONG	49.8 µs
12/7/2023, 11:02:23 PM	127.0.0.1	default/redis-	55736	PING	{ }	PONG	41.1 µs
12/7/2023, 11:02:28 PM	127.0.0.1	default/redis-	35466	PING	{ }	PONG	37.1 µs
12/7/2023, 11:02:28 PM	127.0.0.1	default/redis-	35474	PING	{ }	PONG	41.7 µs
12/7/2023, 11:02:33 PM	127.0.0.1	default/redis-	35480	PING	{ }	PONG	46.1 µs
12/7/2023, 11:02:33 PM	127.0.0.1	default/redis-	35488	PING	{ }	PONG	38.9 µs
12/7/2023, 11:02:38 PM	127.0.0.1	default/redis-	57204	PING	{ }	PONG	45.6 µs
12/7/2023, 11:02:38 PM	default/	10.	6379	GET	{ key: ...	{"data":[{" ...	885.2 µs
12/7/2023, 11:02:38 PM	127.0.0.1	default/redis-	57216	PING	{ }	PONG	36.9 µs
12/7/2023, 11:02:38 PM	default/	10.	6379	GET	{ key: ...	{"data":[{" ...	1.4 ms
12/7/2023, 11:02:43 PM	127.0.0.1	default/redis-	57224	PING	{ }	PONG	49.4 µs
12/7/2023, 11:02:43 PM	127.0.0.1	default/redis-	57230	PING	{ }	PONG	42.7 µs

Slow HTTP requests



This will take some of the guesswork out of troubleshooting.

Did the call from my browser make it through all the layers of networking successfully?

Did my app return an error before or after hitting the database?

The logs make it look like everything was successful... did the expected response actually leave the container?

demo!

Pros:

- All components are open-source and self-hostable
- Cloud version is free, and isn't aggressive about upselling

Cons:

- Has a learning / discovery curve
- Helm chart has oddities
- No Helm chart for the self-hosted UI
- Some backend pods crash with obtuse errors

Tech Radar rating: **Assess**

My rating: **Adopt**