

Atualização ELK em Ubuntu

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Atualização Elasticsearch

1. Efetuar login no servidor com um cliente SSH.
2. Para confirmar qual versão do Elasticsearch você possui instalada atualmente, execute o comando abaixo e em seguida verifique o campo de "number":

```
$ curl -u elastic:senhacorreta* -X GET "localhost:9200?pretty"
```

**no campo de "senhacorreta", preencha com a senha de acesso do usuário elastic.*

```
{
  "name" : "templetelk",
  "cluster_name" : "elasticsearch",
  "cluster_uuid" : "hZMo5K0rSeSSZ2KvskaYsA",
  "version" : {
    "number" : "7.4.0",
    "build_flavor" : "default",
    "build_type" : "deb",
    "build_hash" : "22e1767283e61a198cb4db791ea66e3f11ab9910",
    "build_date" : "2019-09-27T08:36:48.569419Z",
    "build_snapshot" : false,
    "lucene_version" : "8.2.0",
    "minimum_wire_compatibility_version" : "6.8.0",
    "minimum_index_compatibility_version" : "6.0.0-beta1"
  },
  "tagline" : "You Know, for Search"
}
```

3. Antes de iniciarmos a atualização, aconselhamos que seja feito backup do arquivo "jvm.options"

Acesse a pasta:

```
$ cd /etc/elasticsearch
```

Faça backup do arquivo:

```
cp jvm.options jvm.options_old
```

4. Pare os serviços do Elasticsearch:

```
$ sudo systemctl stop elasticsearch.service
```

```

[root@edipo-dev ~]# sudo systemctl status elasticsearch.service
● elasticsearch.service - Elasticsearch
   Loaded: loaded (/usr/lib/systemd/system/elasticsearch.service; enabled; vendor preset: disabled)
   Active: inactive (dead) since Thu 2022-02-03 18:27:06 -03; 4s ago
     Docs: http://www.elastic.co
   Process: 5556 ExecStart=/usr/share/elasticsearch/bin/elasticsearch -p ${PID_DIR}/elasticsearch.pid --quiet (code=exited, status=143)
   Main PID: 5556 (code=exited, status=143)

Feb 03 17:16:33 edipo-dev elasticsearch[5556]: at org.elasticsearch.bootstrap.Elasticsearch.main(Elasticsearch.java:115)
Feb 03 17:16:33 edipo-dev elasticsearch[5556]: at org.elasticsearch.bootstrap.Elasticsearch.main(Elasticsearch.java:92)
Feb 03 17:16:33 edipo-dev elasticsearch[5556]: Caused by: java.lang.IllegalArgumentException: Unconditional Delete not supported
Feb 03 17:16:33 edipo-dev elasticsearch[5556]: at org.apache.logging.log4j.core.appender.rolling.action.DeleteAction.<init>(DeleteAction.java:71)
Feb 03 17:16:33 edipo-dev elasticsearch[5556]: at org.apache.logging.log4j.core.appender.rolling.action.DeleteAction.createDeleteAction(DeleteAction.java:212)
Feb 03 17:16:33 edipo-dev elasticsearch[5556]: ... 25 more
Feb 03 17:16:33 edipo-dev elasticsearch[5556]: 2022-02-03 18:16:33,016 main ERROR Null object returned for Delete in DefaultRolloverStrategy.
Feb 03 17:17:02 edipo-dev systemd[1]: Started Elasticsearch.
Feb 03 18:27:05 edipo-dev systemd[1]: Stopping Elasticsearch...
Feb 03 18:27:06 edipo-dev systemd[1]: Stopped Elasticsearch.

```

5. Liste as versões disponíveis da aplicação:

```
$ apt-cache madison elasticsearch
```

Se ao executar o comando acima, não retornar as versões da aplicação, como na imagem abaixo, execute os próximos comandos, caso seja mostrado a listagem com as versões disponíveis, pule para o passo seguinte.

```

root@templetelk:~# apt-cache madison elasticsearch
root@templetelk:~#

```

```
$ wget -qO - https://artifacts.elastic.co/GPG-KEY-elasticsearch | apt-key add -
```

```

root@templetelk:~# wget -qO - https://artifacts.elastic.co/GPG-KEY-elasticsearch | apt-key add -
OK

```

```
$ sh -c 'echo "deb https://artifacts.elastic.co/packages/7.x/apt stable main" > /etc/apt/sources.list.d/elastic-7.x.list'
```

```
root@templetelk:~# sh -c 'echo "deb https://artifacts.elastic.co/packages/7.x/apt stable main" > /etc/apt/sources.list.d/elastic-7.x.list'
```

```
$ apt update
```

```
root@templetelk:~# apt update
Get:1 https://artifacts.elastic.co/packages/7.x/apt stable InRelease [13.7 kB]
Get:2 https://artifacts.elastic.co/packages/7.x/apt stable/main amd64 Packages [93.4 kB]
Hit:3 http://br.archive.ubuntu.com/ubuntu focal InRelease
Get:4 http://br.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:5 http://br.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:6 http://br.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [601 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:8 https://artifacts.elastic.co/packages/7.x/apt stable/main i386 Packages [70.5 kB]
Get:9 http://br.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,567 kB]
Get:10 http://br.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [301 kB]
Get:11 https://esm.ubuntu.com/infra/ubuntu focal-infra-security InRelease [7,426 B]
Get:12 http://br.archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [14.7 kB]
Get:13 http://br.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [666 kB]
Get:14 http://br.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [902 kB]
Get:15 https://esm.ubuntu.com/infra/ubuntu focal-infra-updates InRelease [7,425 B]
Get:16 http://br.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [200 kB]
Get:17 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [1,235 kB]
Get:18 http://security.ubuntu.com/ubuntu focal-security/main i386 Packages [375 kB]
Get:19 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [217 kB]
Get:20 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [9,560 B]
Fetched 6,617 kB in 3s (1,921 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
17 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Execute o comando abaixo para exibir as versões disponíveis do Elasticsearch:

```
$ apt-cache madison elasticsearch
```

elasticsearch	7.14.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.14.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.13.4	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.13.3	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.13.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.13.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.13.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.12.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.12.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.11.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.11.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.11.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.10.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.10.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.10.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.9.3	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.9.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.9.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.9.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.8.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.8.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.7.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.7.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.6.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.6.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.6.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.5.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.5.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.5.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.4.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.4.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.4.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.3.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.3.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.3.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.2.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.2.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.1.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.1.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.0.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
elasticsearch	7.0.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages

6. Selecionando a versão 7.10.0 do Elasticsearch:

```
$ apt-get install elasticsearch=7.10.0
```

```
root@templetelk:~# apt-get install elasticsearch=7.10.0
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages will be upgraded:
  elasticsearch
1 upgraded, 0 newly installed, 0 to remove and 16 not upgraded.
Need to get 319 MB of archives.
After this operation, 43.5 MB of additional disk space will be used.
Get:1 https://artifacts.elastic.co/packages/7.x/apt stable/main amd64 elasticsearch amd64 7.10.0 [319 MB]
Fetched 319 MB in 39s (8,114 kB/s)
(Reading database ... 189924 files and directories currently installed.)
Preparing to unpack .../elasticsearch_7.10.0_amd64.deb ...
Unpacking elasticsearch (7.10.0) over (7.4.0) ...
Setting up elasticsearch (7.10.0) ...
Installing new version of config file /etc/elasticsearch/jvm.options ...
Installing new version of config file /etc/elasticsearch/log4j2.properties ...
Installing new version of config file /etc/default/elasticsearch ...
Created elasticsearch keystore in /etc/elasticsearch/elasticsearch.keystore
Processing triggers for systemd (245.4-4ubuntu3.15) ...
```

```
Configuration file '/etc/elasticsearch/jvm.options'
==> Modified (by you or by a script) since installation.
==> Package distributor has shipped an updated version.
What would you like to do about it ? Your options are:
  Y or I  : install the package maintainer's version
  N or O  : keep your currently-installed version
  D       : show the differences between the versions
  Z       : start a shell to examine the situation
The default action is to keep your current version.
*** jvm.options (Y/I/N/O/D/Z) [default=N] ? Y
```

7. Abra o arquivo jvm.options:

```
$ vim /etc/elasticsearch/jvm.options
```

8. Insira os campos abaixo no arquivo:

```
# log4j 2
-Dlog4j.shutdownHookEnabled=false
-Dlog4j2.disable.jmx=true
-Dlog4j2.formatMsgNoLookups=true
```

9. Salve as alterações apertando ESC no teclado e em seguida digite:

```
: w!
```

10. Recarregue os serviços:

```
$ systemctl daemon-reload
```

11. Inicie os serviços do ElasticSearch:

```
$ sudo systemctl start elasticsearch.service
```

12. Verifique se a aplicação foi iniciada com sucesso:

```
$ sudo systemctl status elasticsearch.service
```

```

● elasticsearch.service - Elasticsearch
   Loaded: loaded (/usr/lib/systemd/system/elasticsearch.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2022-02-09 15:44:33 -03; 2min 39s ago
     Docs: https://www.elastic.co
    Main PID: 41177 (java)
      Tasks: 60 (limit: 4612)
     Memory: 1.2G
    CGroup: /system.slice/elasticsearch.service
            └─41177 /usr/share/elasticsearch/jdk/bin/java -Xshare:auto -Des.networkaddress.cache.ttl=60 -Des.networkaddress.cache.negative.ttl=10
              └─41370 /usr/share/elasticsearch/modules/x-pack-ml/platform/linux-x86_64/bin/controller

Feb 09 15:44:18 templetelk systemd[1]: Starting Elasticsearch...
Feb 09 15:44:33 templetelk systemd[1]: Started Elasticsearch.

```

13. Para conferir a versão do Elasticsearch, execute:

```
$ curl -u elastic:senhacorreta* -X GET "localhost:9200/?pretty"
```

**no campo de "senhacorreta", preencha com a senha de acesso do usuário elastic.*

```

{
  "name" : "templetelk",
  "cluster_name" : "elasticsearch",
  "cluster_uuid" : "hZMo5K0rSeSSZ2KvskaYsA",
  "version" : {
    "number" : "7.10.0",
    "build_flavor" : "default",
    "build_type" : "deb",
    "build_hash" : "51e9d6f22758d0374a0f3f5c6e8f3a7997850f96",
    "build_date" : "2020-11-09T21:30:33.964949Z",
    "build_snapshot" : false,
    "lucene_version" : "8.7.0",
    "minimum_wire_compatibility_version" : "6.8.0",
    "minimum_index_compatibility_version" : "6.0.0-beta1"
  },
  "tagline" : "You Know, for Search"
}

```

Atualização Kibana

1. Pare os serviços do Kibana:

```
$ sudo systemctl stop kibana.service
```

2. Confirme se os serviços foram parados:

```
$ sudo systemctl status kibana.service
```

```
root@templetelk:~# sudo systemctl status kibana.service
● kibana.service - Kibana
   Loaded: loaded (/etc/systemd/system/kibana.service; enabled; vendor preset: enabled)
   Active: inactive (dead) since Wed 2022-02-09 16:11:04 -03; 16s ago
     Process: 1022 ExecStart=/usr/share/kibana/bin/kibana -c /etc/kibana/kibana.yml (code=exited, status=0/SUCCESS)
    Main PID: 1022 (code=exited, status=0/SUCCESS)

Feb 08 17:01:02 templetelk systemd[1]: Started Kibana.
Feb 09 16:10:56 templetelk systemd[1]: Stopping Kibana...
Feb 09 16:11:04 templetelk systemd[1]: kibana.service: Succeeded.
Feb 09 16:11:04 templetelk systemd[1]: Stopped Kibana.
```

3. Liste as versões disponíveis da aplicação:

```
$ apt-cache madison kibana
```

kibana	7.14.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.14.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.13.4	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.13.3	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.13.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.13.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.13.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.12.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.12.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.11.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.11.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.11.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.10.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.10.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.10.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.9.3	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.9.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.9.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.9.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.8.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.8.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.7.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.7.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.6.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.6.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.6.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.5.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.5.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.5.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.4.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.4.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.4.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.3.2	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.3.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.3.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.2.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.2.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.1.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.1.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.0.1	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages
kibana	7.0.0	https://artifacts.elastic.co/packages/7.x/apt	stable/main	amd64	Packages

4. Selecionando a versão 7.10.0 do Kibana:

```
$ apt-get install kibana=7.10.0
```

```
root@templetelk:~# apt-get install kibana=7.10.0
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages will be upgraded:
  kibana
1 upgraded, 0 newly installed, 0 to remove and 16 not upgraded.
Need to get 257 MB of archives.
After this operation, 20.1 MB disk space will be freed.
Get:1 https://artifacts.elastic.co/packages/7.x/apt stable/main amd64 kibana amd64 7.10.0 [257 MB]
Fetched 257 MB in 39s (6,535 kB/s)
(Reading database ... 189886 files and directories currently installed.)
Preparing to unpack .../kibana_7.10.0_amd64.deb ...
Stopping kibana service... OK
Unpacking kibana (7.10.0) over (7.4.0) ...
Setting up kibana (7.10.0) ...
Installing new version of config file /etc/default/kibana ...
Installing new version of config file /etc/init.d/kibana ...
```

Na opção abaixo, coloque como “N” para que o seu arquivo kibana.yml configurado atualmente

não seja substituído:

```
Configuration file '/etc/kibana/kibana.yml'
==> Modified (by you or by a script) since installation.
==> Package distributor has shipped an updated version.
What would you like to do about it ? Your options are:
  Y or I  : install the package maintainer's version
  N or O  : keep your currently-installed version
  D       : show the differences between the versions
  Z       : start a shell to examine the situation
The default action is to keep your current version.
*** kibana.yml (Y/I/N/O/D/Z) [default=N] ? N
```

5. Após a atualização finalizar, recarregue os serviços:

```
$ sudo systemctl daemon-reload
```

6. Inicie os serviços do Kibana:

```
$ sudo systemctl start kibana.service
```

7. Verifique se os serviços foram iniciados com sucesso:

```
$ sudo systemctl status kibana.service
```

```
root@templetelk:~# sudo systemctl status kibana.service
● kibana.service - Kibana
   Loaded: loaded (/etc/systemd/system/kibana.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2022-02-09 16:38:39 -03; 8s ago
     Main PID: 43125 (node)
        Tasks: 11 (limit: 4612)
       Memory: 198.5M
      CGroup: /system.slice/kibana.service
              └─43125 /usr/share/kibana/bin/./node/bin/node /usr/share/kibana/bin/./src/cli/dist

Feb 09 16:38:39 templetelk systemd[1]: Started Kibana.
```

8. Acesse a aplicação e faça login para confirmar o sucesso da atualização:

Help us improve the Elastic Stack

Want to help us improve the Elastic Stack? Data usage collection is currently disabled. Enabling data usage collection helps us manage and improve our products and services. See details.

Enable

Disable

Home

 Add data  Manage  Dev tools




Enterprise Search

Search everything →

Build a powerful search experience.

Connect your users to relevant data.


Unify your team content.



Observability

Monitor infrastructure metrics.

Trace application requests.



Kibana

Analyze data in dashboards.

Search and find insights.

Design pixel-perfect presentations.