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Hosting&monitoring

Kari Systä

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Tampere University

Deployment pipeline (a possible example)

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App users

App Developer

Develop & test → VMS → Build → Test → Pack → Deploy → App ← Operate
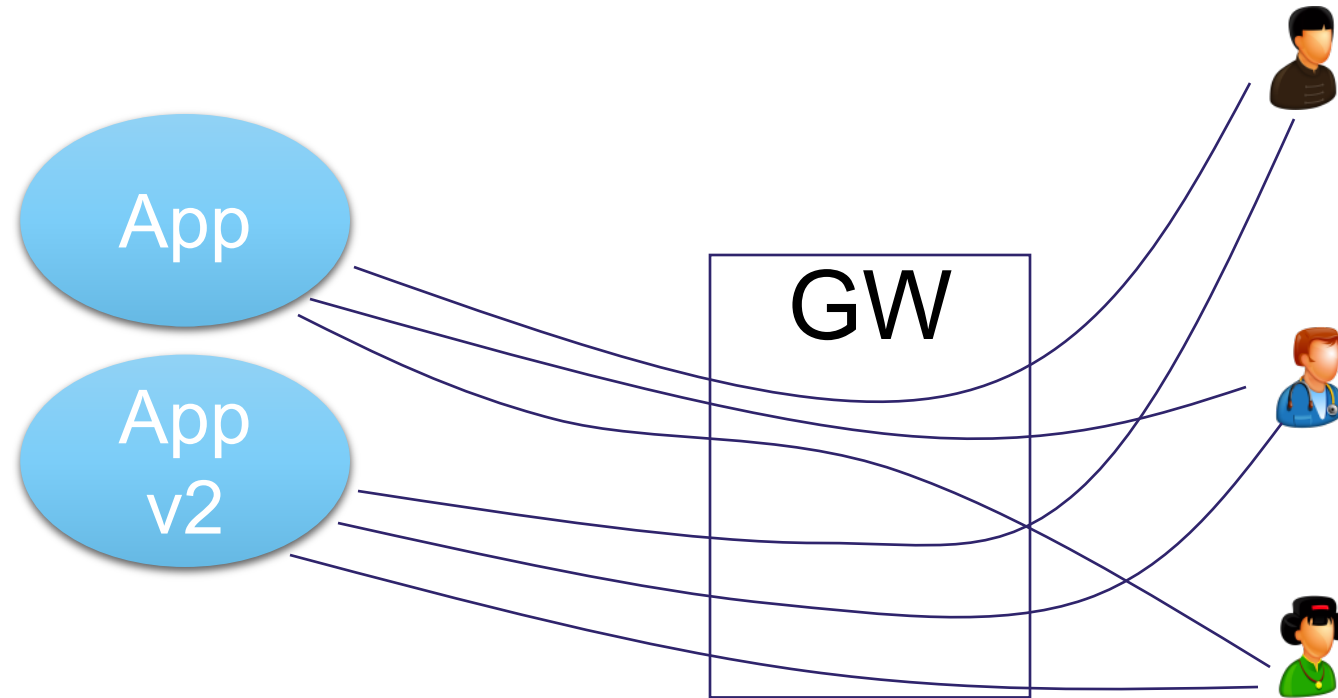
App v2
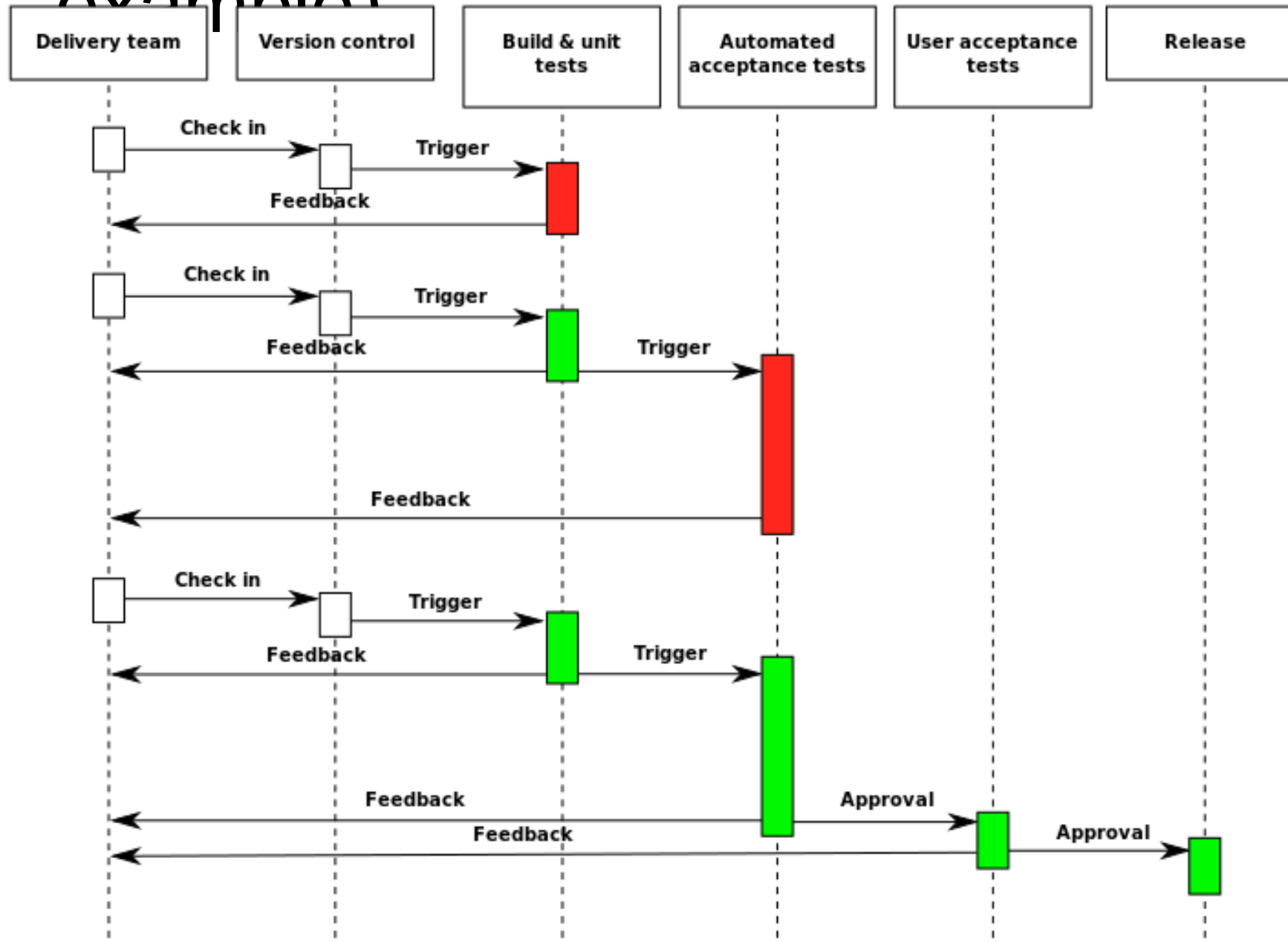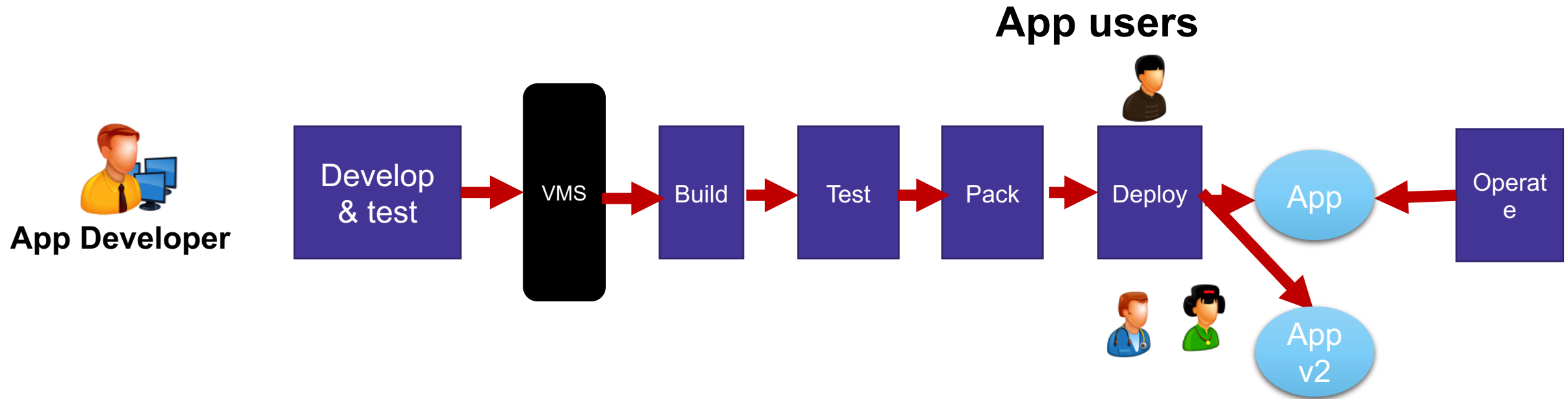
A possible strategy to deploy a new version?
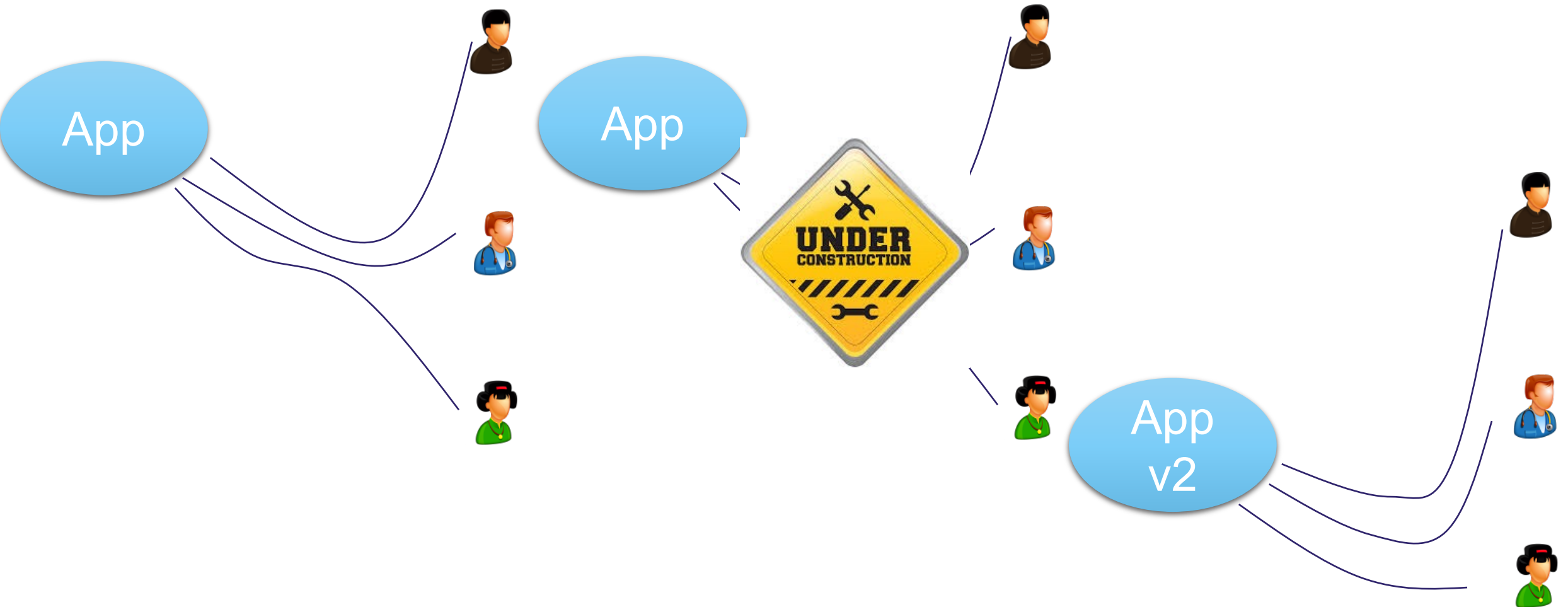
Problems & issues?

Deployment strategies

Basic Deployment (aka Suicide) (https://harness.io/2018/02/deployment-strategies-continuous-delivery/) all nodes are updated at the same time

Rolling Deployment (https://harness.io/2018/02/deployment-strategies-continuous-delivery/) nodes are updated incrementally,
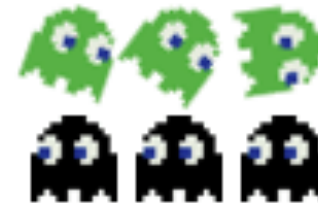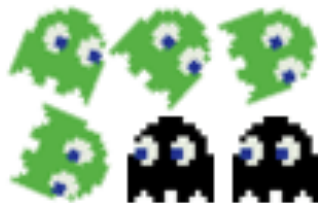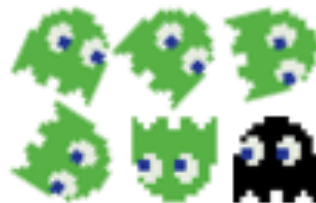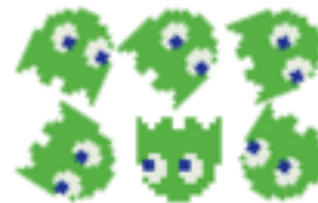
(http://martinfowler.com/bliki/BlueGreenDeployment.html) the new version (called green) is set up in parallel with the current (blue). When new (green) is ready, the router is switched to new (green) and blue is left as a backup. If something goes wrong with new, the router can be switched back to old - that means easy "rollback".

Canary Releases (http://martinfowler.com/bliki/CanaryRelease.html)
implements the deployment incrementally. In this case the router first directs
only part of the customers to the new version. If feedback is is good, the
other customers are moved to new version, too

Before

Live

V1.1

After

Live Phase 1   Live Phase 2   Live Phase 3

verification   verification

V1.2   V1.1   V1.2   V1.1   V1.2

How about the data?

Creation and initialization
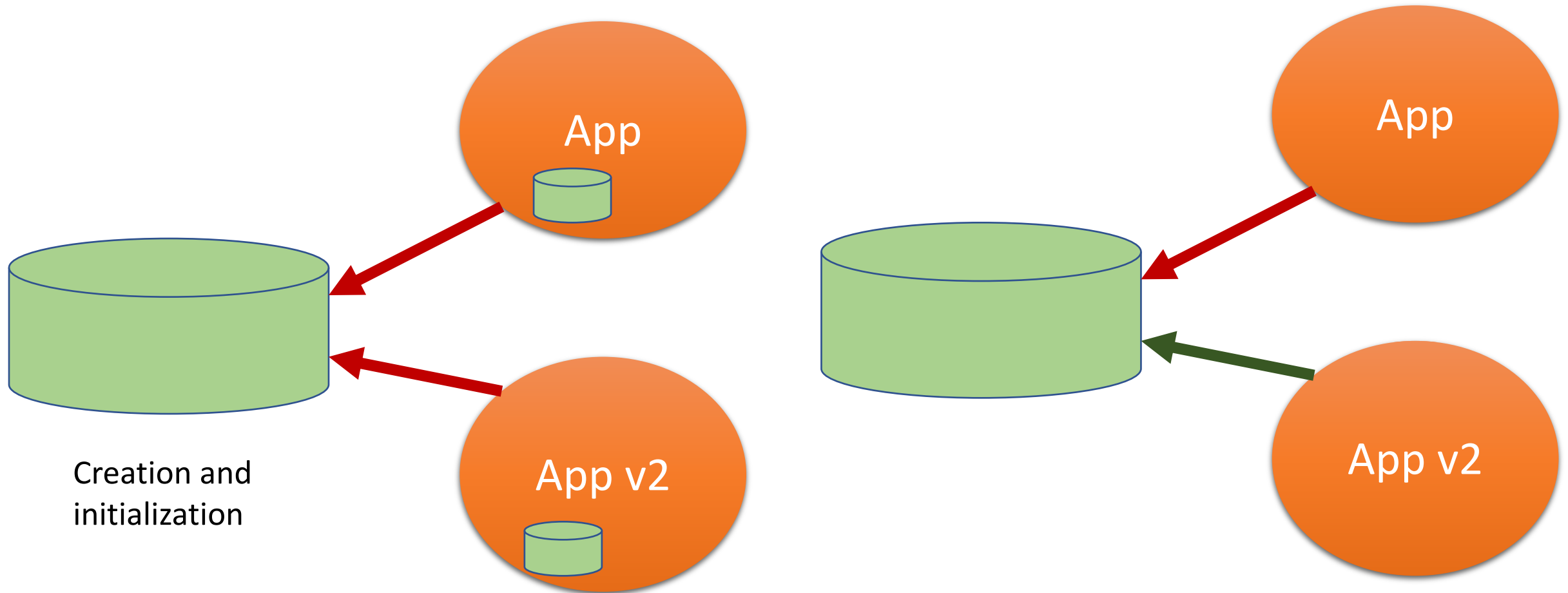
Data migration

- Versions of the data bases

- Data migration scripts are needed.

- Rollback need to be possible

They are then **sorted by version number** and **executed in order**:
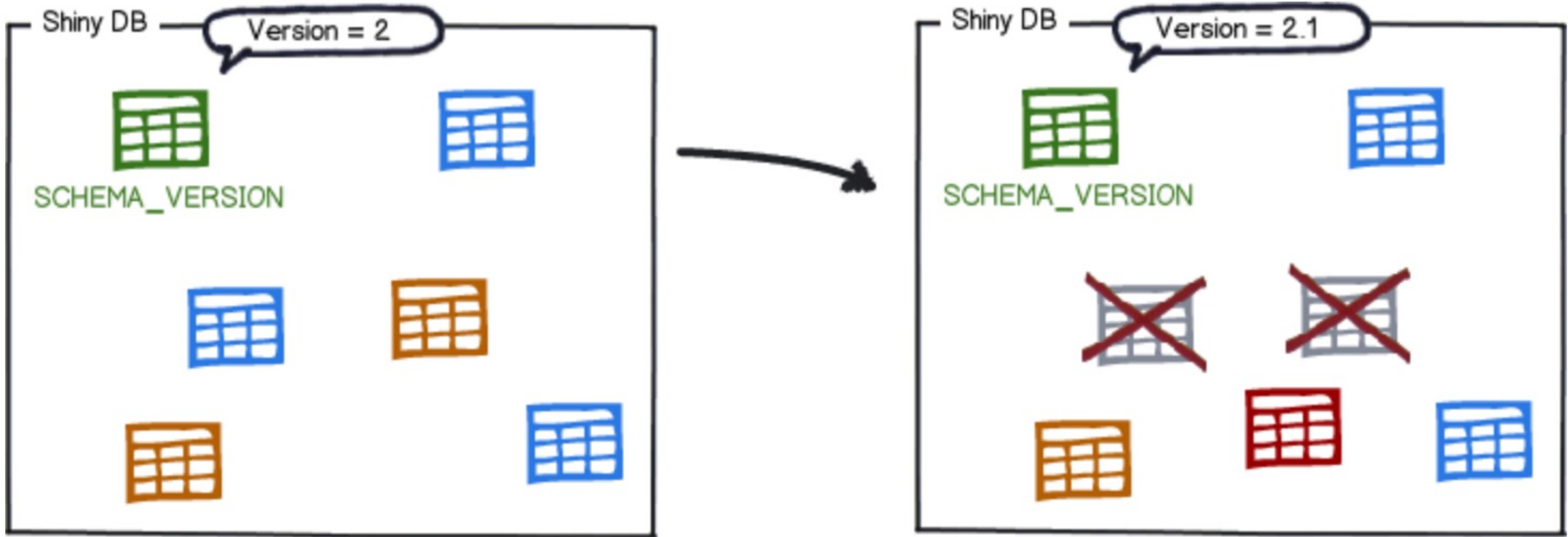
The **schema history table** is **updated** accordingly:

flyway_schema_history

installed_rank	version	description	type	script	checksum	installed_by	installed_on	execution_time	success
1	1	Initial Setup	SQL	V1__Initial_Setup.sql	1996767037	axel	2016-02-04 22:23:00.0	546	true
2	2	First Changes	SQL	V2__First_Changes.sql	1279644856	axel	2016-02-06 09:18:00.0	127	true
3	2.1	Refactoring	JDBC	V2_1__Refactoring		axel	2016-02-10 17:45:05.4	251	true

Example of data base automation https://flywaydb.org

" Flyway is an open-source database migration tool. It strongly favors simplicity and convention over configuration. It is based around just 6 basic commands: Migrate, Clean, Info, Validate, Baseline and Repair. Migrations can be written in SQL (database-specific syntax (such as PL/SQL, T-SQL, …) is supported) or Java (for advanced data transformations or dealing with LOBs)."

Automation challenges

- "…provisioning scripts were considered error-prone and, according to developers, they did not work in some environments…"
- "…automation of the network in was said to be difficult in addition to dealing with legacy system…"
- "Networks are pretty hard. Some of the databases are pretty hard too because the old relational databases haven't been designed to be clustered…"

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Huge number or tools available

- https://digital.ai/periodic-table-of-devops-tools
- https://landscape.cncf.io

PERIODIC TABLE OF DEVOPS TOOLS (V3)

1 Os — **Gl** GitLab	2 En — **Sp** Splunk

Legend — Element type:
- Os — Open Source
- Fr — Free
- Fm — Freemium
- Pd — Paid
- En — Enterprise

Categories:
- Source Control Mgmt.
- Database Automation
- Continuous Integration
- Testing
- Configuration
- Deployment
- Containers
- Release Orchestration
- Cloud
- AIOps
- Analytics
- Monitoring
- Security
- Collaboration

Element	Name
1 Os **Gl**	GitLab
2 En **Sp**	Splunk
3 Fm **Gh**	GitHub
4 En **Dt**	Datical
5 En **XLr**	XebiaLabs XL Release
6 Fm **Aws**	AWS
7 Pd **Az**	Azure
8 En **Gc**	Google Cloud
9 Fm **Op**	OpenShift
10 Fm **Sg**	Sumo Logic
11 Os **Sv**	Subversion
12 En **Db**	DBMaestro
13 Os **Dk**	Docker
14 En **Ur**	UrbanCode Release
15 Pd **Af**	Azure Functions
16 Pd **Ld**	Lambda
17 Fm **Ic**	IBM Cloud
18 Os **Fd**	Fluentd
19 En **Cw**	ISPW
20 En **Dp**	Delphix
21 Os **Jn**	Jenkins
22 Fm **Cs**	Codeship
23 Os **Fn**	FitNesse
24 Fr **Ju**	JUnit
25 Fr **Ka**	Karma
26 Fm **Su**	SoapUI
27 En **Ch**	Chef
28 Fr **Tf**	Terraform
29 En **XLd**	XebiaLabs XL Deploy
30 En **Ud**	UrbanCode Deploy
31 Os **Ku**	Kubernetes
32 En **Cc**	CA CD Director
33 En **Pr**	Plutora Release
34 En **Al**	Alibaba Cloud
35 Os **Os**	OpenStack
36 Os **Ps**	Prometheus
37 Pd **At**	Artifactory
38 Fm **Rg**	Redgate
39 Pd **Ba**	Bamboo
40 Fm **Vs**	VSTS
41 Fr **Se**	Selenium
42 Fr **Jm**	JMeter
43 Os **Ja**	Jasmine
44 Pd **Sl**	Sauce Labs
45 En **An**	Ansible
46 Os **Ru**	Rudder
47 Os **Oc**	Octopus Deploy
48 Os **Go**	GoCD
49 Os **Ms**	Mesos
50 En **Gke**	GKE
51 Fm **Om**	OpenMake
52 En **Cp**	AWS CodePipeline
53 Pd **Cy**	Cloud Foundry
54 En **It**	ITRS
55 Pd **Nx**	Nexus
56 Os **Fw**	Flyway
57 Os **Tr**	Travis CI
58 Fm **Tc**	TeamCity
59 Os **Ga**	Gatling
60 Fr **Tn**	TestNG
61 Fm **Tt**	Tricentis Tosca
62 Pd **Pe**	Perfecto
63 En **Pu**	Puppet
64 Os **Pa**	Packer
65 Fm **Cd**	AWS CodeDeploy
66 En **Ec**	ElectricCloud
67 Os **Ra**	Rancher
68 Pd **Aks**	AKS
69 En **Rk**	Rkt
70 En **Sp**	Spinnaker
71 Pd **Ir**	Iron.io
72 Pd **Mg**	Moogsoft
73 Fm **Bb**	BitBucket
74 En **Pf**	Perforce
75 Fm **Cr**	Circle CI
76 Pd **Cb**	AWS CodeBuild
77 Fr **Cu**	Cucumber
78 Os **Mc**	Mocha
79 Os **Lo**	Locust.io
80 En **Mf**	Micro Focus UFT
81 Os **Sa**	Salt
82 En **Ce**	CFEngine
83 En **Eb**	ElasticBox
84 En **Ca**	CA Automic
85 En **De**	Docker Enterprise
86 Pd **Ae**	AWS ECS
87 Fm **Cf**	Codefresh
88 Os **Hm**	Helm
89 Os **Aw**	Apache OpenWhisk
90 Os **Ls**	Logstash
91 En **XLi**	XebiaLabs XL Impact
92 Os **Ki**	Kibana
93 Fm **Nr**	New Relic
94 En **Dt**	Dynatrace
95 En **Dd**	Datadog
96 Fm **Ad**	AppDynamics
97 Os **El**	ElasticSearch
98 Os **Ni**	Nagios
99 Os **Zb**	Zabbix
100 En **Zn**	Zenoss
101 En **Cx**	Checkmarx SAST
102 En **Sg**	Signal Sciences
103 En **Bd**	BlackDuck
104 Os **Sr**	SonarQube
105 Os **Hv**	HashiCorp Vault
106 En **Sw**	ServiceNow
107 Pd **Jr**	Jira
108 Fm **Tl**	Trello
109 Fm **Sk**	Slack
110 Fm **St**	Stride
111 En **Cn**	CollabNet VersionOne
112 En **Ry**	Remedy
113 En **Ac**	Agile Central
114 Pd **Og**	OpsGenie
115 Pd **Pd**	Pagerduty
116 Os **Sn**	Snort
117 Fm **Tw**	Tripwire
118 En **Ck**	CyberArk
119 En **Vc**	Veracode
120 En **Ff**	Fortify SCA

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PERIODIC TABLE OF DEVOPS TOOLS (V3)

Legend:

Os	Open Source
Fr	Free
Fm	Freemium
Pd	Paid
En	Enterprise

Color	Category	Color	Category	Color	Category
	Source Control Mgmt.		Deployment		Analytics
	Database Automation		Containers		Monitoring
	Continuous Integration		Release Orchestration		Security
	Testing		Cloud		Collaboration
	Configuration		AIOps		

Database automation

#	Sym	Name	Type
1	Gl	GitLab	Os
2	Sp	Splunk	En
3	Gh	GitHub	Fm
4	Dt	Datical	En
5	XLr	XebiaLabs XL Release	En
6	Aws	AWS	Fm
7	Az	Azure	Pd
8	Gc	Google Cloud	En
9	Op	OpenShift	Fm
10	Sg	Sumo Logic	Fm
11	Sv	Subversion	Os
12	Db	DBMaestro	En
13	Dk	Docker	Os
14	Ur	UrbanCode Release	En
15	Af	Azure Functions	Pd
16	Ld	Lambda	En
17	Ic	IBM Cloud	Fm
18	Fd	Fluentd	Os
19	Cw	ISPW	En
20	Dp	Delphix	Fm
21	Jn	Jenkins	Os
22	Cs	Codeship	
		FitNesse	
		JUnit	
		Karma	
		SoapUI	Fm
27	Ch	Chef	En
28	Tf	Terraform	Fr
29	XLd	XebiaLabs XL Deploy	En
30	Ud	UrbanCode Deploy	En
31	Ku	Kubernetes	
32	Cc	CA CD Director	En
33	Pr	Plutora Release	
34	Al	Alibaba Cloud	
35	Os	OpenStack	
36	Ps	Prometheus	
37	At	Artifactory	Pd
38	Rg	Redgate	Fm
39	Ba	Bamboo	Pd
40	Vs	VSTS	Fm
41	Se	Selenium	Fr
42	Jm	JMeter	Fr
43	Ja	Jasmine	Os
44	Sl	Sauce Labs	Pd
45	An	Ansible	En
46	Ru	Rudder	Os
47	Oc	Octopus Deploy	En
48	Go	GoCD	En
49	Ms	Mesos	Os
50	Gke	GKE	
51	Om	OpenMake	Fm
52	Cp	AWS CodePipeline	
53	Cy	Cloud Foundry	Pd
54	It	ITRS	En
55	Nx	Nexus	Pd
56	Fw	Flyway	Os
57	Tr	Travis CI	Os
58	Tc	TeamCity	Fm
59	Ga	Gatling	Os
60	Tn	TestNG	Fr
61	Tt	Tricentis Tosca	Fm
62	Pe	Perfecto	Pd
63	Pu	Puppet	En
64	Pa	Packer	Os
65	Cd	AWS CodeDeploy	Fm
66	Ec	ElectricCloud	En
67	Ra	Rancher	
68	Aks	AKS	Pd
69	Rk	Rkt	
70	Sp	Spinnaker	
71	Ir	Iron.io	
72	Mg	Moogsoft	Pd
73	Bb	BitBucket	Fm
74	Pf	Perforce	En
75	Cr	Circle CI	Fm
76	Cb	AWS CodeBuild	Pd
77	Cu	Cucumber	Fr
78	Mc	Mocha	Os
79	Lo	Locust.io	Os
80	Mf	Micro Focus UFT	En
81	Sa	Salt	Os
82	Ce	CFEngine	Os
83	Eb	ElasticBox	En
84	Ca	CA Automic	En
85	De	Docker Enterprise	En
86	Ae	AWS ECS	Pd
87	Cf	Codefresh	Fm
88	Hm	Helm	Os
89	Aw	Apache OpenWhisk	Os
90	Ls	Logstash	Os
91	XLi	XebiaLabs XL Impact	En
92	Ki	Kibana	Os
93	Nr	New Relic	Fm
94	Dt	Dynatrace	En
95	Dd	Datadog	En
96	Ad	AppDynamics	Fm
97	El	ElasticSearch	Os
98	Ni	Nagios	Os
99	Zb	Zabbix	Os
100	Zn	Zenoss	En
101	Cx	Checkmarx SAST	En
102	Sg	Signal Sciences	En
103	Bd	BlackDuck	En
104	Sr	SonarQube	Os
105	Hv	HashiCorp Vault	Os
106	Sw	ServiceNow	En
107	Jr	Jira	Pd
108	Tl	Trello	Fm
109	Sk	Slack	Fm
110	St	Stride	Fm
111	Cn	CollabNet VersionOne	En
112	Ry	Remedy	En
113	Ac	Agile Central	En
114	Og	OpsGenie	Pd
115	Pd	Pagerduty	Pd
116	Sn	Snort	Os
117	Tw	Tripwire	Fm
118	Ck	CyberArk	En
119	Vc	Veracode	En
120	Ff	Fortify SCA	En

XebiaLabs
Enterprise DevOps

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PERIODIC TABLE OF DEVOPS TOOLS (V3)

Legend — Attribute tags

- Os — Open Source
- Fr — Free
- Fm — Freemium
- Pd — Paid
- En — Enterprise

Legend — Categories (colors)

- Source Control Mgmt.
- Database Automation
- Continuous Integration
- Testing
- Configuration
- Deployment
- Containers
- Release Orchestration
- Cloud
- AIOps
- Analytics
- Monitoring
- Security
- Collaboration

Elements

- 1 — Os — Gl — GitLab
- 2 — En — Sp — Splunk
- 3 — Fm — Gh — GitHub
- 4 — En — Dt — Datical
- 5 — En — XLr — XebiaLabs XL Release
- 6 — Fm — Aws — AWS
- 7 — Pd — Az — Azure
- 8 — En — Gc — Google Cloud
- 9 — Fm — Op — OpenShift
- 10 — Fm — Sg — Sumo Logic
- 11 — Os — Sv — Subversion
- 12 — En — Db — DBMaestro
- 13 — Os — Dk — Docker
- 14 — En — Ur — UrbanCode Release
- 15 — Pd — Af — Azure Functions
- 16 — Pd — Ld — Lambda
- 17 — Fm — Ic — IBM Cloud
- 18 — Os — Fd — Fluentd
- 19 — En — Cw — ISPW
- 20 — Os — Dp — Delphix
- 21 — Os — Jn — Jenkins
- 22 — Fm — Cs — Codeship
- 23 — Os — Fn — FitNesse
- 24 — Fr — Ju — JUnit
- 25 — Fr — Ka — Karma
- 26 — Fm — Su — SoapUI
- 27 — En — Ch — Chef
- 28 — Fr — Tf — Terraform
- 29 — En — XLd — XebiaLabs XL Deploy
- 30 — En — Ud — UrbanCode Deploy
- 31 — Os — Ku — Kubernetes
- 32 — En — Cc — CA CD Director
- 33 — En — Pr — Plutora Release
- 34 — Pd — Al — Alibaba Cloud
- 35 — Os — Os — OpenStack
- 36 — Os — Ps — Prometheus
- 37 — Pd — At — Artifactory
- 38 — Fm — Rg — Redgate
- 39 — Pd — Ba — Bamboo
- 40 — Pd — Vs — VSTS
- 41 — Fr — Se — Selenium
- 42 — Fr — Jm — JMeter
- 43 — Os — Ja — Jasmine
- 44 — Pd — Sl — Sauce Labs
- 45 — En — An — Ansible
- 46 — Os — Ru — Rudder
- 47 — Os — Oc — Octopus Deploy
- 48 — Os — Go — GoCD
- 49 — Os — Ms — Mesos
- 50 — Pd — Gke — GKE
- 51 — Fm — Om — OpenMake
- 52 — Pd — Cp — AWS CodePipeline
- 53 — Pd — Cy — Cloud Foundry
- 54 — En — It — ITRS
- 55 — Pd — Nx — Nexus
- 56 — Os — Fw — Flyway
- 57 — Os — Tr — Travis CI
- 58 — Fm — Tc — TeamCity
- 59 — Os — Ga — Gatling
- 60 — Fr — Tn — TestNG
- 61 — Fm — Tt — Tricentis Tosca
- 62 — Pd — Pe — Perfecto
- 63 — En — Pu — Puppet
- 64 — Os — Pa — Packer
- 65 — Fm — Cd — AWS CodeDeploy
- 66 — En — Ec — ElectricCloud
- 67 — Os — Ra — Rancher
- 68 — Pd — Aks — AKS
- 69 — En — Rk — Rkt
- 70 — En — Sp — Spinnaker
- 71 — En — Ir — Iron.io
- 72 — Pd — Mg — Moogsoft
- 73 — Fm — Bb — BitBucket
- 74 — En — Pf — Perforce
- 75 — Fm — Cr — Circle CI
- 76 — Pd — Cb — AWS CodeBuild
- 77 — Fr — Cu — Cucumber
- 81 — Os — Ce — CFEngine
- 82 — Os — Eb — ElasticBox
- 83 — En — Ca — CA Automic
- 84 — En — De — Docker Enterprise
- 85 — En — Ae — AWS ECS
- 86 — Pd — Cf — Codefresh
- 87 — Fm — Hm — Helm
- 88 — Os — Aw — Apache OpenWhisk
- 89 — Os — Ls — Logstash
- 91 — En — XLi — XebiaLabs XL Impact
- 92 — Os — Ki — Kibana
- 93 — Fm — Nr — New Relic
- 94 — En — Dt — Dynatrace
- 95 — En — Dd — Datadog
- 96 — Fm — Ad — AppDynamics
- 97 — Os — El — ElasticSearch
- 98 — Os — Ni — Nagios
- 99 — Os — Zb — Zabbix
- 100 — En — Zn — Zenoss
- 101 — En — Cx — Checkmarx SAST
- 102 — — Sg — Signal Sciences
- 103 — En — Bd — BlackDuck
- 104 — Os — Sr — SonarQube
- 105 — Os — Hv — HashiCorp Vault
- 106 — En — Sw — ServiceNow
- 107 — Pd — Jr — Jira
- 108 — Fm — Tl — Trello
- 109 — Fm — Sk — Slack
- 110 — Fm — St — Stride
- 111 — En — Cn — CollabNet VersionOne
- 112 — En — Ry — Remedy
- 113 — En — Ac — Agile Central
- 114 — Pd — Og — OpsGenie
- 115 — Pd — Pd — Pagerduty
- 116 — Os — Sn — Snort
- 117 — Fm — Tw — Tripwire
- 118 — En — Ck — CyberArk
- 119 — En — Vc — Veracode
- 120 — En — Ff — Fortify SCA

Callout: Continuous Integration

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Legend:

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- Pd — Paid
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- Configuration
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- Containers
- Release Orchestration
- Cloud
- AIOps
- Analytics
- Monitoring
- Security
- Collaboration

#	Symbol	Name	Type
1	Gl	GitLab	Os
2	Sp	Splunk	En
3	Gh	GitHub	Os
4	Dt	Datical	En
5	XLr	XebiaLabs XL Release	En
6	Aws	AWS	Fm
7	Az	Azure	Pd
8	Gc	Google Cloud	En
9	Op	OpenShift	Fm
10	Sg	Sumo Logic	Fm
11	Sv	Subversion	Os
12	Db	DBMaestro	En
13	Dk	Docker	Os
14	Ur	UrbanCode Release	En
15	Af	Azure Functions	Pd
16	Ld	Lambda	En
17	Ic	IBM Cloud	Fm
18	Fd	Fluentd	Os
19	Cw	ISPW	En
20	Dp	Delphix	En
21	Jn	Jenkins	Os
22	Cs	Codeship	Fm
23	Fn	FitNesse	Os
24	Ju	JUnit	Fr
25	Ka	Karma	Fr
26	Su	SoapUI	Fm
27	Ch	Chef	En
28	Tf	Terraform	Fr
29	XLd	XebiaLabs XL Deploy	En
30	Ud	UrbanCode Deploy	En
31	Ku	Kubernetes	Os
32	Cc	CA CD Director	En
33	Pr	Plutora Release	En
34	Al	Alibaba Cloud	En
35	Os	OpenStack	Os
36	Ps	Prometheus	Os
37	At	Artifactory	Pd
38	Rg	Redgate	Fm
39	Ba	Bamboo	Pd
40	Vs	VSTS	Fm
41	Se	Selenium	Fr
42	Jm	JMeter	Fr
43	Ja	Jasmine	Os
44	Sl	Sauce Labs	Pd
45	An	Ansible	En
46	Ru	Rudder	Os
47	Oc	Octopus Deploy	En
48	Go	GoCD	Os
49	Ms	Mesos	Os
50	Gke	GKE	Pd
51	Om	OpenMake	Fm
52	Cp	AWS CodePipeline	En
53	Cy	Cloud Foundry	Pd
54	It	ITRS	En
55	Nx	Nexus	Pd
56	Fw	Flyway	Os
57	Tr	Travis CI	Os
58	Tc	TeamCity	Fm
59	Ga	Gatling	Os
60	Tn	TestNG	Fr
61	Tt	Tricentis Tosca	Fm
62	Pe	Perfecto	Pd
63	Pu	Puppet	En
64	Pa	Packer	Os
65	Cd	AWS CodeDeploy	Fm
66	Ec	ElectricCloud	En
67	Ra	Rancher	Os
68	Aks	AKS	Pd
69	Rk	Rkt	Os
70	Sp	Spinnaker	Os
71	Ir	Iron.io	En
72	Mg	Moogsoft	Pd
73	Bb	BitBucket	Fm
74	Pf	Perforce	En
75	Cr	Circle CI	Fm
76	Cb	AWS CodeBuild	Pd
77	Cu	Cucumber	Fr
78	Mc	Mocha	Os
79	Lo	Locust.io	Os
80	Mf	Micro Focus UFT	En
81	Sa	Salt	Os
83	Cd	AWS CodeDeploy	En
84			En
85			En
86	Ae	AWS ECS	Pd
87	Cf	Codefresh	Fm
88	Hm	Helm	Os
89	Aw	Apache OpenWhisk	Os
90	Ls	Logstash	Os
91	XLi	XebiaLabs XL Impact	En
92	Ki	Kibana	Os
93	Nr	New Relic	Fm
94	Dt	Dynatrace	En
95	Dd	Datadog	En
96	Ad	AppDynamics	Fm
97	El	ElasticSearch	Os
98	Ni	Nagios	Os
99	Zb	Zabbix	Os
100	Zn	Zenoss	En
101	Cx	Checkmarx SAST	En
102	Sg	Signal Sciences	En
103	Bd	BlackDuck	En
104	Sr	SonarQube	Os
105	Hv	HashiCorp Vault	Os
106	Sw	ServiceNow	En
107	Jr	Jira	Pd
108	Tl	Trello	Fm
109	Sk	Slack	Fm
110	St	Stride	Fm
111	Cn	CollabNet VersionOne	En
112	Ry	Remedy	En
113	Ac	Agile Central	En
114	Og	OpsGenie	Pd
115	Pd	Pagerduty	Pd
116	Sn	Snort	Os
117	Tw	Tripwire	Fm
118	Ck	CyberArk	En
119	Vc	Veracode	En
120	Ff	Fortify SCA	En

Testing

PERIODIC TABLE OF DEVOPS TOOLS (V3)

Legend — Categories:

Os Open Source	Source Control Mgmt.	Deployment	Analytics
Fr Free	Database Automation	Containers	Monitoring
Fm Freemium	Continuous Integration	Release Orchestration	Security
Pd Paid	Testing	Cloud	Collaboration
En Enterprise	Configuration	AIOps	

1 Os **Gl** GitLab																2 En **Sp** Splunk
3 Fm **Gh** GitHub	4 En **Dt** Datical										5 En **XLr** XebiaLabs XL Release	6 Fm **Aws** AWS	7 Pd **Az** Azure	8 En **Gc** Google Cloud	9 Fm **Op** OpenShift	10 Fm **Sg** Sumo Logic
11 Os **Sv** Subversion	12 En **Db** DBMaestro										13 Os **Dk** Docker	14 En **Ur** UrbanCode Release	15 Pd **Af** Azure Functions	16 Pd **Ld** Lambda	17 Fm **Ic** IBM Cloud	18 Os **Fd** Fluentd
19 En **Cw** ISPW	20 En **Dp** Delphix	21 Os **Jn** Jenkins	22 Fm **Cs** Codeship	23 Os **Fn** FitNesse	24 Fr **Ju** JUnit	25 Fr **Ka** Karma	26 Fm **Su** SoapUI	27 En **Ch** Chef	28 Fr **Tf** Terraform	29 En **XLd** XebiaLabs XL Deploy	30 En **Ud** UrbanCode Deploy	31 Os **Ku** Kubernetes	32 En **Cc** CA CD Director	33 En **Pr** Plutora Release	34 En **Al** Alibaba Cloud	35 Os **Os** OpenStack	36 Os **Ps** Prometheus
37 Pd **At** Artifactory	38 Fm **Rg** Redgate	39 Pd **Ba** Bamboo	40 Fm **Vs** VSTS	41 Fr **Se** Selenium	42 Fr **Jm** JMeter	43 Os **Ja** Jasmine	44 Pd **Sl** Sauce Labs	45 En **An** Ansible	46 Os **Ru** Rudder	47 En **Oc** Octopus Deploy	48 Os **Go** GoCD	49 Os **Ms** Mesos	50 Pd **Gke** GKE	51 Fm **Om** OpenMake	52 Pd **Cp** AWS CodePipeline	53 Pd **Cy** Cloud Foundry	54 En **It** ITRS
55 Pd **Nx** Nexus	56 Os **Fw** Flyway	57 Os **Tr** Travis CI	58 Os **Tc** TeamCity	59 Fm **Ga** Gatling	60 Fr **Tn** TestNG	61 Fm **Tt** Tricentis Tosca	62 Pd **Pe** Perfecto	63 En **Pu** Puppet	64 Os **Pa** Packer	65 Fm **Cd** AWS CodeDeploy	66 En **Ec** ElectricCloud	67 Os **Ra** Rancher	68 Pd **Aks** AKS	69 Os **Rk** Rkt	70 Os **Sp** Spinnaker	71 Os **Ir** Iron.io	72 Pd **Mg** Moogsoft
73 Fm **Bb** BitBucket	74 En **Pf** Perforce	75 Fm **Cr** Circle CI	76 Pd **Cb** AWS CodeBuild	77 Fr **Cu** Cucumber	78 Os **Mc** Mocha	79 Os **Lo** Locust.io	80 En **Mf** Micro Focus UFT	81 Os **Sa** Salt	82 Os **Ce** CFEngine	83 **Eb** ElasticBox				88 Os **Hm** Helm	89 Os **Aw** Apache OpenWhisk	90 Os **Ls** Logstash

Configuration

91 En **XLi** XebiaLabs XL Impact	92 Os **Ki** Kibana	93 Fm **Nr** New Relic	94 En **Dt** Dynatrace	95 En **Dd** Datadog	96 Fm **Ad** AppDynamics	97 Os **El** ElasticSearch	98 Os **Ni** Nagios	99 Os **Zb** Zabbix	100 En **Zn** Zenoss	101 En **Cx** Checkmarx SAST	102 En **Sg** Signal Sciences	103 En **Bd** BlackDuck	104 Os **Sr** SonarQube	105 Os **Hv** HashiCorp Vault
106 En **Sw** ServiceNow	107 Pd **Jr** Jira	108 Fm **Tl** Trello	109 Fm **Sk** Slack	110 Fm **St** Stride	111 En **Cn** CollabNet VersionOne	112 En **Ry** Remedy	113 En **Ac** Agile Central	114 Pd **Og** OpsGenie	115 Pd **Pd** Pagerduty	116 Os **Sn** Snort	117 Fm **Tw** Tripwire	118 En **Ck** CyberArk	119 En **Vc** Veracode	120 En **Ff** Fortify SCA

XebiaLabs
Enterprise DevOps

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PERIODIC TABLE OF DEVOPS TOOLS (V3)

Legend (status): Os Open Source · Fr Free · Fm Freemium · Pd Paid · En Enterprise

Categories: Source Control Mgmt. · Database Automation · Continuous Integration · Testing · Configuration · Deployment · Containers · Release Orchestration · Cloud · AIOps · Analytics · Monitoring · Security · Collaboration

#	Symbol	Name	Status
1	Gl	GitLab	Os
2	Sp	Splunk	En
3	Gh	GitHub	Fm
4	Dt	Datical	En
5	XLr	XebiaLabs XL Release	En
6	Aws	AWS	Fm
7	Az	Azure	Pd
8	Gc	Google Cloud	En
9	Op	OpenShift	Fm
10	Sg	Sumo Logic	Fm
11	Sv	Subversion	Os
12	Db	DBMaestro	En
13	Dk	Docker	Os
14	Ur	UrbanCode Release	En
15	Af	Azure Functions	Pd
16	Ld	Lambda	En
17	Ic	IBM Cloud	Fm
18	Fd	Fluentd	Os
19	Cw	ISPW	En
20	Dp	Delphix	En
21	Jn	Jenkins	Os
22	Cs	Codeship	Fm
23	Fn	FitNesse	Os
24	Ju	JUnit	Fr
25	Ka	Karma	Fr
26	Su	SoapUI	Fm
27	Ch	Chef	En
28	Tf	Terraform	Fr
29	XLd	XebiaLabs XL Deploy	En
30	Ud	UrbanCode Deploy	En
31	Ku	Kubernetes	Os
32	Cc	CA CD Director	En
33	Pr	Plutora Release	En
34	Al	Alibaba Cloud	En
35	Os	OpenStack	Os
36	Ps	Prometheus	Os
37	At	Artifactory	Pd
38	Rg	Redgate	Fm
39	Ba	Bamboo	Pd
40	Vs	VSTS	Pd
41	Se	Selenium	Fr
42	Jm	JMeter	Fr
43	Ja	Jasmine	Os
44	Sl	Sauce Labs	Pd
45	An	Ansible	En
46	Ru	Rudder	Os
47	Oc	Octopus Deploy	Os
48	Go	GoCD	Os
49	Ms	Mesos	Os
50	Gke	GKE	Pd
51	Om	OpenMake	Fm
52	Cp	AWS CodePipeline	En
53	Cy	Cloud Foundry	Pd
54	It	ITRS	En
55	Nx	Nexus	Pd
56	Fw	Flyway	Os
57	Tr	Travis CI	Os
58	Tc	TeamCity	Os
59	Ga	Gatling	Os
60	Tn	TestNG	Fr
61	Tt	Tricentis Tosca	Fm
62	Pe	Perfecto	Pd
63	Pu	Puppet	En
64	Pa	Packer	Os
65	Cd	AWS CodeDeploy	Fm
66	Ec	ElectricCloud	En
67	Ra	Rancher	Os
68	Aks	AKS	Pd
69	Rk		En
70	Sp		Os
71	Ir		En
72	Mg	Moogsoft	Pd
73	Bb	BitBucket	Fm
74	Pf	Perforce	En
75	Cr	Circle CI	Fm
76	Cb	AWS CodeBuild	Pd
77	Cu	Cucumber	Fr
78	Mc	Mocha	Os
79	Lo	Locust.io	Os
80	Mf	Micro Focus UFT	En
81	Sa	Salt	Os
82	Ce	CFEngine	Os
83	Eb	ElasticBox	En
84	Ca	CA Automic	En
85	De	Docker Enterprise	Os
86		OpenWhisk	Os
90	Ls	Logstash	Os
91	XLi	XebiaLabs XL Impact	En
92	Ki	Kibana	Os
93	Nr	New Relic	Fm
94	Dt	Dynatrace	En
95	Dd	Datadog	En
96	Ad	AppDynamics	Fm
97	El	ElasticSearch	Os
98	Ni	Nagios	Os
99	Zb	Zabbix	Os
100	Zn	Zenoss	En
101	Cx	Checkmarx SAST	En
102	Sg	Signal Sciences	En
103	Bd	BlackDuck	En
104	Sr	SonarQube	Os
105	Hv	HashiCorp Vault	Os
106	Sw	ServiceNow	En
107	Jr	Jira	Pd
108	Tl	Trello	Fm
109	Sk	Slack	Fm
110	St	Stride	Fm
111	Cn	CollabNet VersionOne	En
112	Ry	Remedy	En
113	Ac	Agile Central	En
114	Og	OpsGenie	Pd
115	Pd	Pagerduty	Pd
116	Sn	Snort	Os
117	Tw	Tripwire	Fm
118	Ck	CyberArk	En
119	Vc	Veracode	En
120	Ff	Fortify SCA	En

Deployment

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PERIODIC TABLE OF DEVOPS TOOLS (V3)

Legend:

- Os — Open Source
- Fr — Free
- Fm — Freemium
- Pd — Paid
- En — Enterprise

Categories:

- Source Control Mgmt.
- Database Automation
- Continuous Integration
- Testing
- Configuration
- Deployment
- Containers
- Release Orchestration
- Cloud
- AIOps
- Analytics
- Monitoring
- Security
- Collaboration

#	Symbol	Name	Type
1	Gl	GitLab	Os
2	Sp	Splunk	En
3	Gh	GitHub	Fm
4	Dt	Datical	En
5	XLr	XebiaLabs XL Release	En
6	Aws	AWS	Fm
7	Az	Azure	Pd
8	Gc	Google Cloud	En
9	Op	OpenShift	Fm
10	Sg	Sumo Logic	Fm
11	Sv	Subversion	Os
12	Db	DBMaestro	En
13	Dk	Docker	Os
14	Ur	UrbanCode Release	En
15	Af	Azure Functions	Pd
16	Ld	Lambda	Pd
17	Ic	IBM Cloud	Fm
18	Fd	Fluentd	Os
19	Cw	ISPW	En
20	Dp	Delphix	En
21	Jn	Jenkins	Os
22	Cs	Codeship	Fm
23	Fn	FitNesse	Os
24	Ju	JUnit	Fr
25	Ka	Karma	Fr
26	Su	SoapUI	Fm
27	Ch	Chef	En
28	Tf	Terraform	Fr
29	XLd	XebiaLabs XL Deploy	En
30	Ud	UrbanCode Deploy	En
31	Ku	Kubernetes	Os
32	Cc	CA CD Director	En
33	Pr	Plutora Release	En
34	Al	Alibaba Cloud	En
35	Os	OpenStack	Os
36	Ps	Prometheus	Os
37	At	Artifactory	Pd
38	Rg	Redgate	Fm
39	Ba	Bamboo	Pd
40	Vs	VSTS	Fm
41	Se	Selenium	Fr
42	Jm	JMeter	Fr
43	Ja	Jasmine	Os
44	Sl	Sauce Labs	Pd
45	An	Ansible	En
46	Ru	Rudder	Os
47	Oc	Octopus Deploy	En
48	Go	GoCD	Os
49	Ms	Mesos	Os
50	Gke	GKE	Pd
51	Om	OpenMake	Fm
52	Cp	AWS CodePipeline	Pd
53	Cy	Cloud Foundry	Pd
54	It	ITRS	En
55	Nx	Nexus	Pd
56	Fw	Flyway	Os
57	Tr	Travis CI	Os
58	Tc	TeamCity	Fm
59	Ga	Gatling	Os
60	Tn	TestNG	Fr
61	Tt	Tricentis Tosca	Fm
62	Pe	Perfecto	Pd
63	Pu	Puppet	En
64	Pa	Packer	Os
65	Cd	AWS CodeDeploy	Fm
66	Ec	ElectricCloud	En
67	Ra	Rancher	Os
68	Aks	AKS	Pd
69	Rk	Rkt	Os
70	Sp	Spinnaker	Os
71	Ir	Iron.io	Pd
72	Mg	Moogsoft	Pd
73	Bb	BitBucket	Fm
74	Pf	Perforce	En
75	Cr	Circle CI	Fm
76	Cb	AWS CodeBuild	Pd
77	Cu	Cucumber	Fr
78	Mc	Mocha	Os
79	Lo	Locust.io	Os
80	Mf	Micro Focus UFT	En
81	Sa	Salt	Os
82	Ce	CFEngine	Os
83	Eb	(Flynn?)	En
84		CA Automic	
85	De	Docker Enterprise	En
86	Ae	AWS ECS	Pd
87	Cf	Codefresh	Fm
88	Hm	Helm	Os
89	Aw	Apache OpenWhisk	Os
90	Ls	Logstash	Os
91	XLi	XebiaLabs XL Impact	En
92	Ki	Kibana	Os
93	Nr	New Relic	Fm
94	Dt	Dynatrace	En
95	Dd	Datadog	En
96	Ad	AppDynamics	En
97	El	ElasticSearch	Os
98	Nl	Nagios	Os
99	Zb	Zabbix	Os
100	Zn	Zenoss	En
101	Cx	Checkmarx SAST	En
102	Sg	Signal Sciences	En
103	Bd	BlackDuck	En
104	Sr	SonarQube	Os
105	Hv	HashiCorp Vault	En
106	Sw	ServiceNow	En
107	Jr	Jira	Pd
108	Tl	Trello	Fm
109	Sk	Slack	Fm
110	St	Stride	Fm
111	Cn	CollabNet VersionOne	En
112	Ry	Remedy	En
113	Ac	Agile Central	En
114	Og	OpsGenie	Pd
115	Pd	Pagerduty	Pd
116	Sn	Snort	Os
117	Tw	Tripwire	Fm
118	Ck	CyberArk	En
119	Vc	Veracode	En
120	Ff	Fortify SCA	En

Containers

PERIODIC TABLE OF DEVOPS TOOLS (V3)

Os	Open Source	
Fr	Free	
Fm	Freemium	
Pd	Paid	
En	Enterprise	

Legend	
Source Control Mgmt.	Deployment
Database Automation	Containers
Continuous Integration	Release Orchestration
Testing	Cloud
Configuration	AIOps
Analytics	
Monitoring	
Security	
Collaboration	

1 Os — **Gl** GitLab

2 En — **Sp** Splunk

3 Fm — **Gh** GitHub
4 En — **Dt** Datical

5 En — **XLr** XebiaLabs XL Release
6 Fm — **Aws** AWS
7 Pd — **Az** Azure
8 En — **Gc** Google Cloud
9 Fm — **Op** OpenShift
10 Fm — **Sg** Sumo Logic

11 Os — **Sv** Subversion
12 En — **Db** DBMaestro

13 Os — **Dk** Docker
14 En — **Ur** UrbanCode Release
15 Pd — **Af** Azure Functions
16 Pd — **Ld** Lambda
17 Fm — **Ic** IBM Cloud
18 Os — **Fd** Fluentd

19 En — **Cw** ISPW
20 En — **Dp** Delphix
21 Os — **Jn** Jenkins
22 Fm — **Cs** Codeship
23 Os — **Fn** FitNesse
24 Fr — **Ju** JUnit
25 Fr — **Ka** Karma
26 Fm — **Su** SoapUI
27 En — **Ch** Chef
28 Fr — **Tf** Terraform
29 En — **XLd** XebiaLabs
30 En — **Ud** UrbanCode Deploy
31 Os — **K** Kubernetes
32 Fm — **Cc** CA CD Director
33 En — **Pr** Plutora Release
34 Os — **Al** Alibaba Cloud
35 Os — **Os** OpenStack
36 Os — **Ps** Prometheus

> Release orchestration

37 Pd — **At** Artifactory
38 Fm — **Rg** Redgate
39 Pd — **Ba** Bamboo
40 Fm — **Vs** VSTS
41 Fr — **Se** Selenium
42 Fr — **Jm** JMeter
43 Os — **Ja** Jasmine
44 Pd — **Sl** Sauce Labs
45 En — **An** Ansible
46 Os — **Ru** Rundeck
50 Fm — **Gke** GKE
51 Fm — **Om** OpenMake
52 En — **Cp** AWS CodePipeline
53 Pd — **Cy** Cloud Foundry
54 En — **It** ITRS

55 Pd — **Nx** Nexus
56 Os — **Fw** Flyway
57 Os — **Tr** Travis CI
58 Os — **Tc** TeamCity
59 En — **Ga** Gatling
60 Fr — **Tn** TestNG
61 Fm — **Tt** Tricentis Tosca
62 Pd — **Pe** Perfecto
63 En — **Pu** Puppet
64 Os — **Pa** Packer
65 Fm — **Cd** AWS CodeDeploy
66 En — **Ec** ElectricCloud
67 Os — **Ra** Rancher
68 Pd — **Aks** AKS
69 En — **Rk** Rkt
70 En — **Sp** Spinnaker
71 Pd — **Ir** Iron.io
72 Pd — **Mg** Moogsoft

73 Fm — **Bb** BitBucket
74 En — **Pf** Perforce
75 Fm — **Cr** Circle CI
76 Pd — **Cb** AWS CodeBuild
77 Fr — **Cu** Cucumber
78 Os — **Mc** Mocha
79 Os — **Lo** Locust.io
80 En — **Mf** Micro Focus UFT
81 Os — **Sa** Salt
82 Os — **Ce** CFEngine
83 En — **Eb** ElasticBox
84 En — **Ca** CA Automic
85 En — **De** Docker Enterprise
86 Pd — **Ae** AWS ECS
87 Fm — **Cf** Codefresh
88 Os — **Hm** Helm
89 Os — **Aw** Apache OpenWhisk
90 Os — **Ls** Logstash

91 En — **XLi** XebiaLabs XL Impact
92 Os — **Ki** Kibana
93 Fm — **Nr** New Relic
94 En — **Dt** Dynatrace
95 En — **Dd** Datadog
96 Fm — **Ad** AppDynamics
97 Os — **El** ElasticSearch
98 Os — **Ni** Nagios
99 Os — **Zb** Zabbix
100 En — **Zn** Zenoss
101 En — **Cx** Checkmarx SAST
102 En — **Sg** Signal Sciences
103 En — **Bd** BlackDuck
104 Os — **Sr** SonarQube
105 Os — **Hv** HashiCorp Vault

106 En — **Sw** ServiceNow
107 Pd — **Jr** Jira
108 Fm — **Tl** Trello
109 Fm — **Sk** Slack
110 Fm — **St** Stride
111 En — **Cn** CollabNet VersionOne
112 En — **Ry** Remedy
113 En — **Ac** Agile Central
114 Pd — **Og** OpsGenie
115 Pd — **Pd** Pagerduty
116 Os — **Sn** Snort
117 Fm — **Tw** Tripwire
118 En — **Ck** CyberArk
119 En — **Vc** Veracode
120 En — **Ff** Fortify SCA

PERIODIC TABLE OF DEVOPS TOOLS (V3)

Os	Open Source	Source Control Mgmt.	Deployment	Analytics
Fr	Free	Database Automation	Containers	Monitoring
Fm	Freemium	Continuous Integration	Release Orchestration	Security
Pd	Paid	Testing	Cloud	Collaboration
En	Enterprise	Configuration	AIOps	

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4 En — Dt — Datical

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6 Fm — Aws — AWS
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9 Fm — Op — OpenShift
10 Fm — Sg — Sumo Logic

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18 Os — Fd — Fluentd

19 En — Cw — ISPW
20 Pd — Dp — Delphix
21 Os — Jn — Jenkins
22 Fm — Cs — Codeship
23 Os — Fn — FitNesse
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25 Fr — Ka — Karma
26 Fm — Su — SoapUI
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31 Os — Ku — Kubernetes
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37 Pd — At — Artifactory
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Cloud

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104 Os — Sr — SonarQube
105 Os — Hv — HashiCorp Vault

106 En — Sw — ServiceNow
107 Pd — Jr — Jira
108 Fm — Tl — Trello
109 Fm — Sk — Slack
110 Fm — St — Stride
111 En — Cn — CollabNet VersionOne
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115 Pd — Pd — Pagerduty
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117 Fm — Tw — Tripwire
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119 En — Vc — Veracode
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Symbol	Meaning
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Fm	Freemium
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En	Enterprise

Categories:
- Source Control Mgmt.
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- Continuous Integration
- Testing
- Configuration
- Deployment
- Containers
- Release Orchestration
- Cloud
- AIOps
- Analytics
- Monitoring
- Security
- Collaboration

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AIOPS

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Pd	Paid
En	Enterprise

Color	Category	Color	Category	Color	Category
	Source Control Mgmt.		Deployment		Analytics
	Database Automation		Containers		Monitoring
	Continuous Integration		Release Orchestration		Security
	Testing		Cloud		Collaboration
	Configuration		AIOps		

1 Os — Gl — GitLab

2 En — Sp — Splunk

3 Fm — Gh — GitHub
4 En — Dt — Datical

5 En — XLr — XebiaLabs XL Release
6 Fm — Aws — AWS
7 Pd — Az — Azure
8 En — Gc — Google Cloud
9 Fm — Op — OpenShift
10 Fm — Sg — Sumo Logic

11 Os — Sv — Subversion
12 En — Db — DBMaestro

13 Os — Dk — Docker
14 En — Ur — UrbanCode Release
15 Pd — Af — Azure Functions
16 Fm — Ld — Lambda
17 Fm — Ic — IBM Cloud
18 Os — Fd — Fluentd

19 En — Cw — ISPW
20 Pd — Dp — Delphix
21 Os — Jn — Jenkins
22 Fm — Cs — Codeship
23 Os — Fn — FitNesse
24 Fr — Ju — JUnit
25 Fr — Ka — Karma
26 Fm — Su — SoapUI
27 En — Ch — Chef
28 Fr — Tf — Terraform
29 En — XLd — XebiaLabs XL Deploy
30 En — Ud — UrbanCode Deploy
31 Os — Ku — Kubernetes
32 En — Cc — CA CD Director
33 En — Pr — Plutora Release
34 En — Al — Alibaba Cloud
35 Os — Os — OpenStack
36 Os — Ps — Prometheus

37 Pd — At — Artifactory
38 Fm — Rg — Redgate
39 Pd — Ba — Bamboo
40 Fm — Vs — VSTS
41 Fr — Se — Selenium
42 Fr — Jm — JMeter
43 Os — Ja — Jasmine
44 Pd — Sl — Sauce Labs
45 En — An — Ansible
46 Os — Ru — Rudder
47 En — Oc — Octopus Deploy
48 Os — Go — GoCD
49 En — Ms — Mesos
50 Pd — Gke — GKE
51 Fm — Om — OpenMake
52 Pd — Cp — AWS CodePipeline
53 Pd — Cy — Cloud Foundry
54 En — It — ITRS

55 Pd — Nx — Nexus
56 Os — Fw — Flyway
57 Os — Tr — Travis CI
58 Fm — Tc — TeamCity
59 Os — Ga — Gatling
60 Fr — Tn — TestNG
61 Fm — Tt — Tricentis Tosca
62 Pd — Pe — Perfecto
63 En — Pu — Puppet
64 Os — Pa — Packer
65 Fm — Cd — AWS CodeDeploy
66 En — Ec — ElectricCloud
67 Os — Ra — Rancher
68 Pd — Aks — AKS
69 Fm — Rk — Rkt
70 En — Sp — Spinnaker
71 Pd — Ir — Iron.io
72 Pd — Mg — Moogsoft

73 Fm — Bb — BitBucket
74 En — Pf — Perforce
75 Fm — Cr — Circle CI
76 Pd — Cb — AWS CodeBuild
77 Fr — Cu — Cucumber
78 Os — Mc — Mocha
79 Os — Lo — Locust.io
80 En — Mf — Micro Focus UFT
81 Os — Sa — Salt
82 Os — Ce — CFEngine
83 En — Eb — ElasticBox
84 En — Ca — CA Automic
85 En — De — Docker Enterprise
86 Pd — Ae — AWS ECS
87 Fm — Cf — Codefresh
88 Os — Hm — Helm
89 Os — Aw — Apache OpenWhisk
90 Os — Ls — Logstash

91 En — XLi — XebiaLabs XL Impact
92 Os — Ki — Kibana
93 Fm — Nr — New Relic
94 En — Dt — Dynatrace
95 En — Dd — Datadog
96 Fm — Ad — AppDynamics
97 Os — El — ElasticSearch
98 Os — Ni — Nagios
99 Os — Zb — Zabbix
100 En — Zn — Zenoss
101 En — Cx — Checkmarx SAST
102 En — Sg — Signal Sciences
103 En — Bd — BlackDuck
104 Os — Sr — SonarQube
105 Os — Hv — HashiCorp Vault

Analytics

107 Pd
108 Fm — Tl — Trello
109 Fm — Sk — Slack
110 Fm — St — Stride
111 En — Cn — CollabNet VersionOne
112 En — Ry — Remedy
113 En — Ac — Agile Central
114 Pd — Og — OpsGenie
115 Pd — Pd — Pagerduty
116 Os — Sn — Snort
117 Fm — Tw — Tripwire
118 En — Ck — CyberArk
119 En — Vc — Veracode
120 En — Ff — Fortify SCA

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PERIODIC TABLE OF DEVOPS TOOLS (V3)

Os	Open Source		Source Control Mgmt.		Deployment		Analytics
			Database Automation		Containers		Monitoring
			Continuous Integration		Release Orchestration		Security
			Testing		Cloud		Collaboration
			Configuration		AIOps		

Source Control mgmt

Monitoring

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11 Os — **Sv** Subversion	**12** En — **Db** DBMaestro

5 En **XLr** XebiaLabs XL Release	6 Fm **Aws** AWS	7 Pd **Az** Azure	8 En **Gc** Google Cloud	9 Fm **Op** OpenShift	10 Fm **Sg** Sumo Logic
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19 En **Cw** ISPW	20 En **Dp** Delphix	21 Os **Jn** Jenkins	22 Fm **Cs** Codeship	23 Os **Fn** FitNesse	24 Fr **Ju** JUnit	25 Fr **Ka** Karma	26 Fm **Su** SoapUI	27 En **Ch** Chef	28 Fr **Tf** Terraform	29 En **XLd** XebiaLabs XL Deploy	30 En **Ud** UrbanCode Deploy	31 Os **Ku** Kubernetes	32 En **Cc** CA CD Director	33 En **Pr** Plutora Release	34 En **Al** Alibaba Cloud	35 Os **Os** OpenStack	36 Os **Ps** Prometheus
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106 En **Sw** ServiceNow	107 Pd **Jr** Jira	108 Fm **Tl** Trello	109 Fm **Sk** Slack	110 Fm **St** Stride	111 En **Cn** CollabNet VersionOne	112 En **Ry** Remedy	113 En **Ac** Agile Central	114 Pd **Og** OpsGenie	115 Pd **Pd** Pagerduty	116 Os **Sn** Snort	117 En **Tw** Tripwire	118 En **Ck** CyberArk	119 En **Vc** Veracode	120 En **Ff** Fortify SCA

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Os	Open Source

Source Control mgmt

	Legend	
Source Control Mgmt.	Deployment	Analytics
...base Automation	Containers	Monitoring
...inuous Integration	Release Orchestration	Security
...ng	Cloud	Collaboration
Configuration	AIOps	

1 Os																	2 En
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Security

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PERIODIC TABLE OF DEVOPS TOOLS (V3)

Os Open Source

- **Source Control Mgmt.**
- Database Automation
- Continuous Integration
- Testing
- Configuration
- **Deployment**
- **Containers**
- **Release Orchestration**
- **Cloud**
- **AIOps**
- **Analytics**
- **Monitoring**
- **Security**
- **Collaboration**

Source Control mgmt

Collaboration

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Pipeline & periodic table

```
                              ┌──────────────────────────┐
                              │   Deployment Pipeline    │
                              └──────────────────────────┘
```

Versioning Control System	Code Management and Analysis	Build System	CI Server	Testing	Configuration and Provisioning	CD Server
Stash (S1) **Git/GitHub** (S1, S2, S15, S17, S58, S63) **BitBucket** (S2) **Subversion** (S20, S30, S33, S38, S39, S42) **IBM Rational ClearCase** (S14)	**SonarQube** (S2, S20) **Ndepend** (S18) **PartCover** (S18) **CheckStyle** (S42) **Flexelint** (S52) **gcov** (S52) **CodePlex Stylecop** (S62)	**Make** (S15) **Maven** (S20) **Ant** (S39) **NAnt** (S18, S47, S54, S62) **MSBuild** (S62)	**Bamboo** (S1, S20, S33) **Jenkins** (S2, S14, S17, S20, S26, S27, S30, S35, S62, S63, S66) **CruiseControl** (S15, S18, S38, S47, S54) **Sysphus** (S21) **Hudson** (S32) **Hydra** (S23) **TeamCity** (S39, S58) **Tinderbox** (S52)	**NUnit** (S18, S62) **TestLink** (S35) **JUnit** (S35) **Athena** (S35) **CUTS** (S54) **NAFT** (S38) **Microsoft MSTest** (S62) **Selenium** (S62) **MbUnit** (S62) **Borland Silk4Net** (S62)	**Puppet** (S58) **Yum** (S58) **Hiera** (S58) **Chef** (S63)	**HockeyApp** (S1) **Deployr** (S17) **Jenkins** (S30) **Microsoft Web Deploy** (S62)

Implications to developers

https://cloudrumblings.io/cloud-farm-pets-cattle-unicorns-and-horses-85271d915260

	Pets — Legacy Infrastructure	Cattle — Cloud-Friendly Infrastructure
	Pets are given names like grumpycat.petstore.com They are unique, lovingly hand raised and cared for When they get ill, you nurse them back to health	Cattle are given numbers like 10200713.cattlerancher.com They are almost identical to other cattle When they get ill, you replace them and get another
	Infrastructure is a permanent fixture in the data center	Infrastructure is stateless, ephemeral, and transient
	Infrastructure takes days to create, are serviced weekly, maintained for years, and requires migration projects to move	Infrastructure is instantiated, modified, destroyed and recreated in minutes from scratch using automated scripts
	Infrastructure is modified during maintenance hours and generally requires special privileges such as root access	Infrastructure uses version-controlled scripts to modify any service without requiring root access or privileged logins
	Infrastructure requires several different teams to coordinate and provision the full environment	Infrastructure is self-service with the ability to provision computing, network and storage services with a single click
	Infrastructure is static, requiring excess capacity to be dormant for use during peak periods of demands	Infrastructure is elastic and scales automatically, expanding and contracting on-demand to service peak usage periods
	Infrastructure is an capital expenditure that charges a fix amount regardless of usage patterns	Infrastructure is a operating expenditure that charges only for services when they are consumed

When your servers get sick, do you nurse them back to health or shoot them?

Implications to developers

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Pets

Cattle

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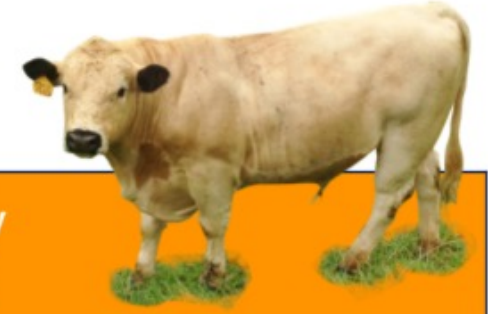
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Infrastructure is self-service with the ability to provision computing, network and storage services with a single click

Infrastructure is elastic and scales automatically, expanding and contracting on-demand to service peak usage periods

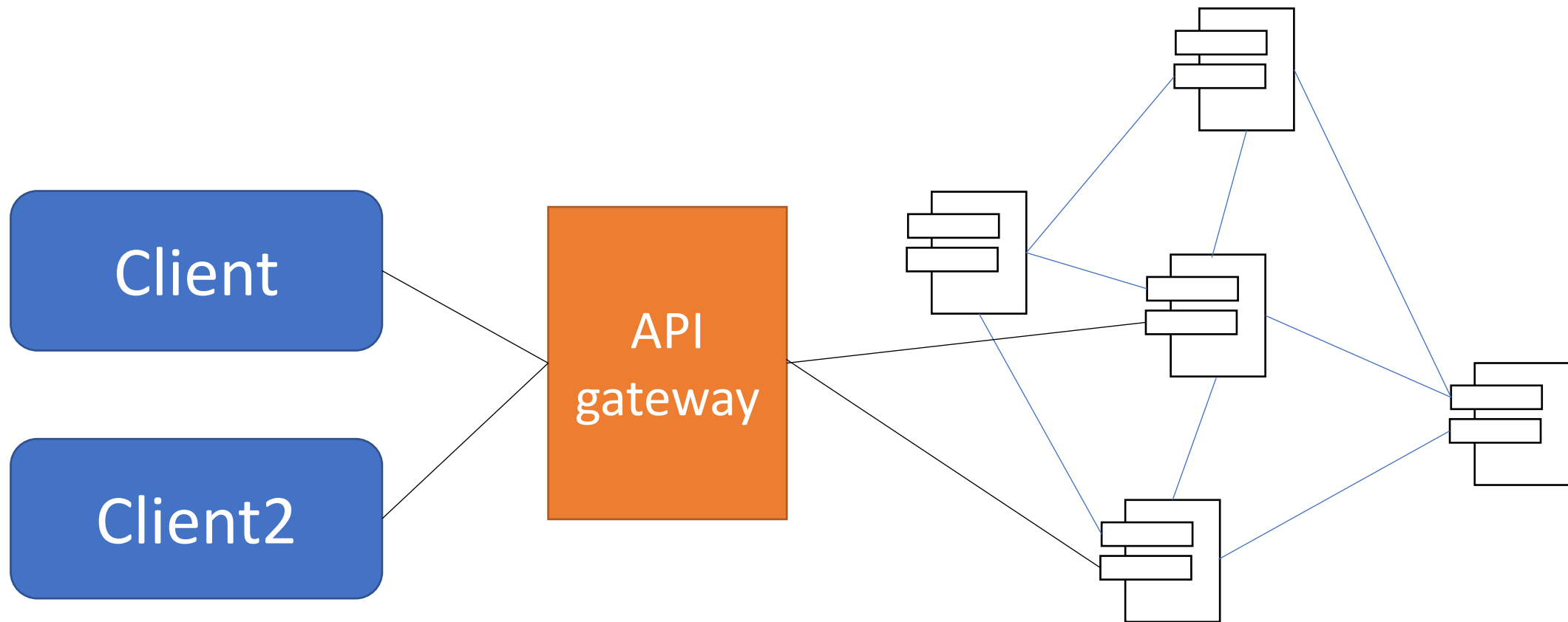Infrastructure is a operating expenditure that charges only for services when they are consumed

When your servers get sick, do you nurse them back to health or shoot them?

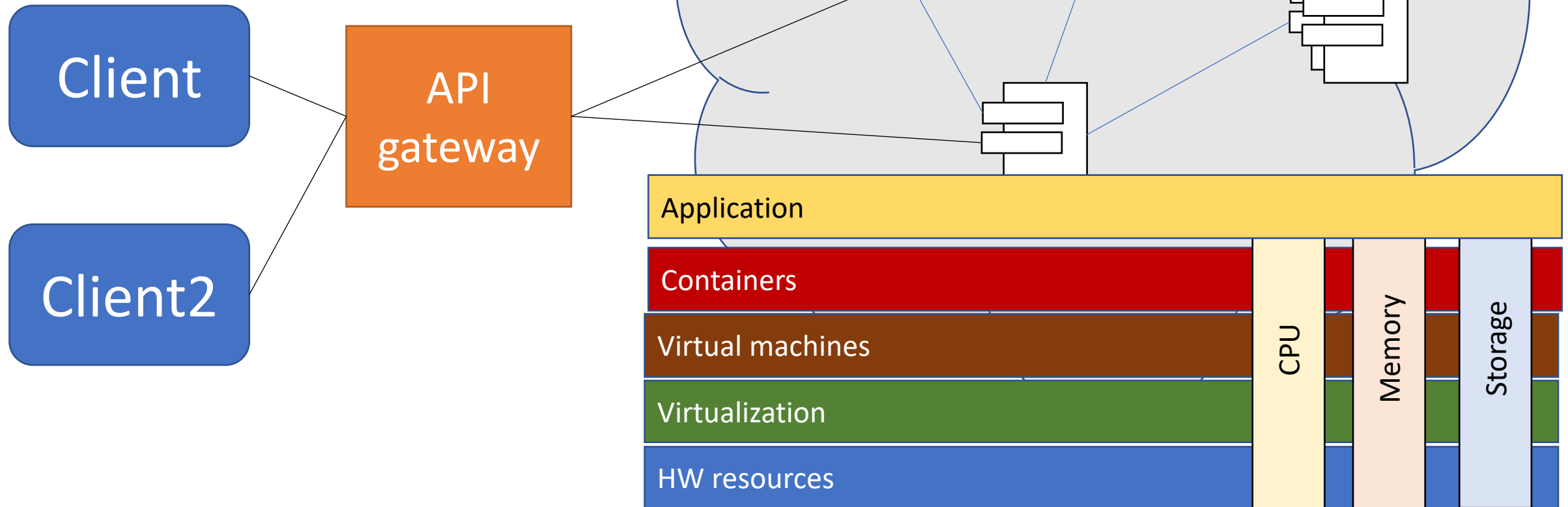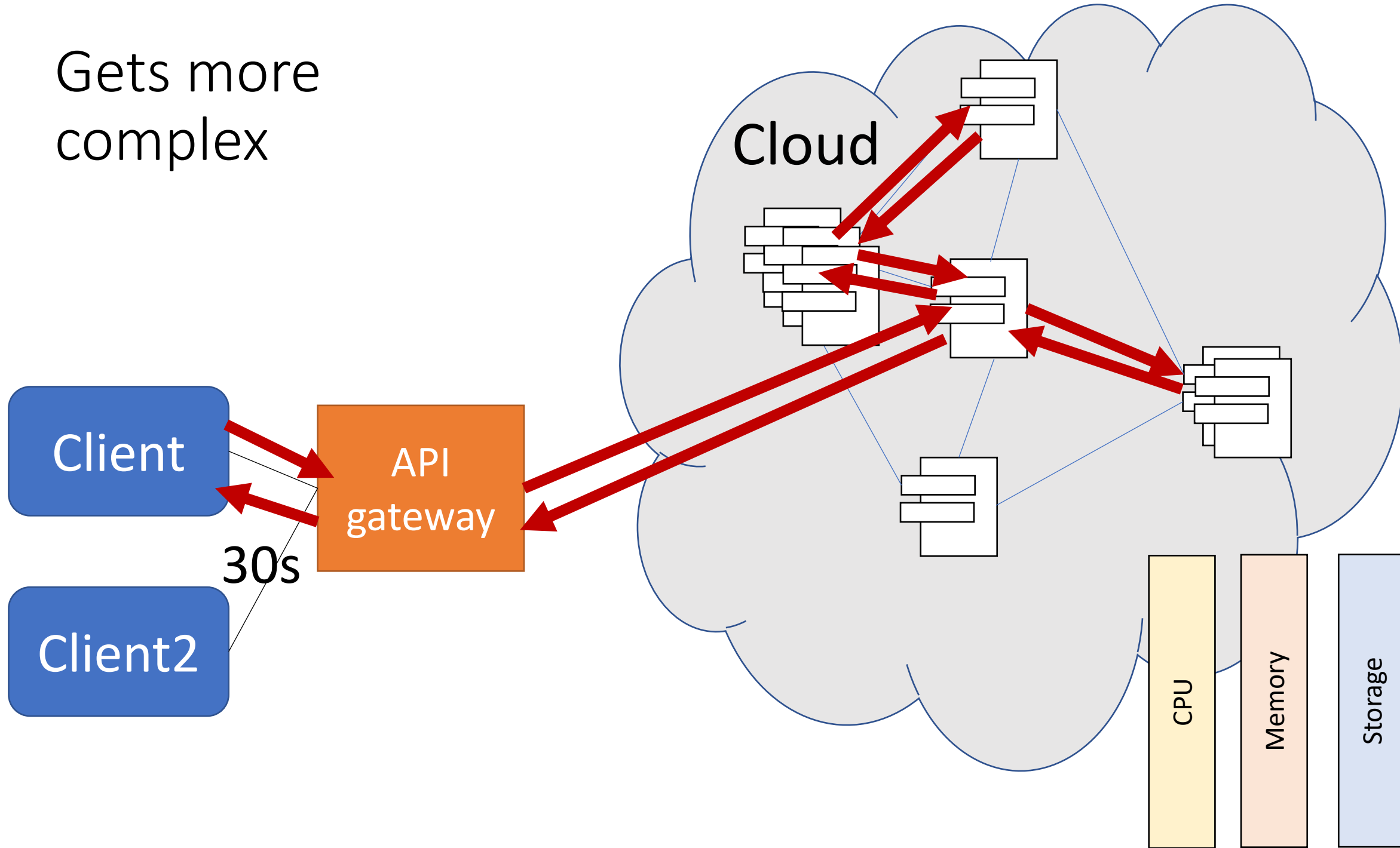| Pets	Cattle
Pets are given names like grumpycat.petstore.com They are unique, lovingly hand raised and cared for When they get ill, you nurse them back to health	Cattle are given numbers like 10200713.cattlerancher.com They are almost identical to other cattle When they get ill, you replace them and get another
Infrastructure is a permanent fixture in the data center	Infrastructure is stateless, ephemeral, and transient
Infrastructure takes days to create, are serviced weekly, maintained for years, and requires migration projects to move	Infrastructure is instantiated, modified, destroyed and recreated in minutes from scratch using automated scripts
Infrastructure is modified during maintenance hours and generally requires special privileges such as root access	Infrastructure uses version-controlled scripts to modify any service without requiring root access or privileged logins
Infrastructure requires several different teams to coordinate and provision the full environment	Infrastructure is self-service with the ability to provision computing, network and storage services with a single click
Infrastructure is static, requiring excess capacity to be dormant for use during peak periods of demands	Infrastructure is elastic and scales automatically, expanding and contracting on-demand to service peak usage periods
Infrastructure is an capital expenditure that charges a fix amount regardless of usage patterns	Infrastructure is a operating expenditure that charges only for services when they are consumed

How to monitor
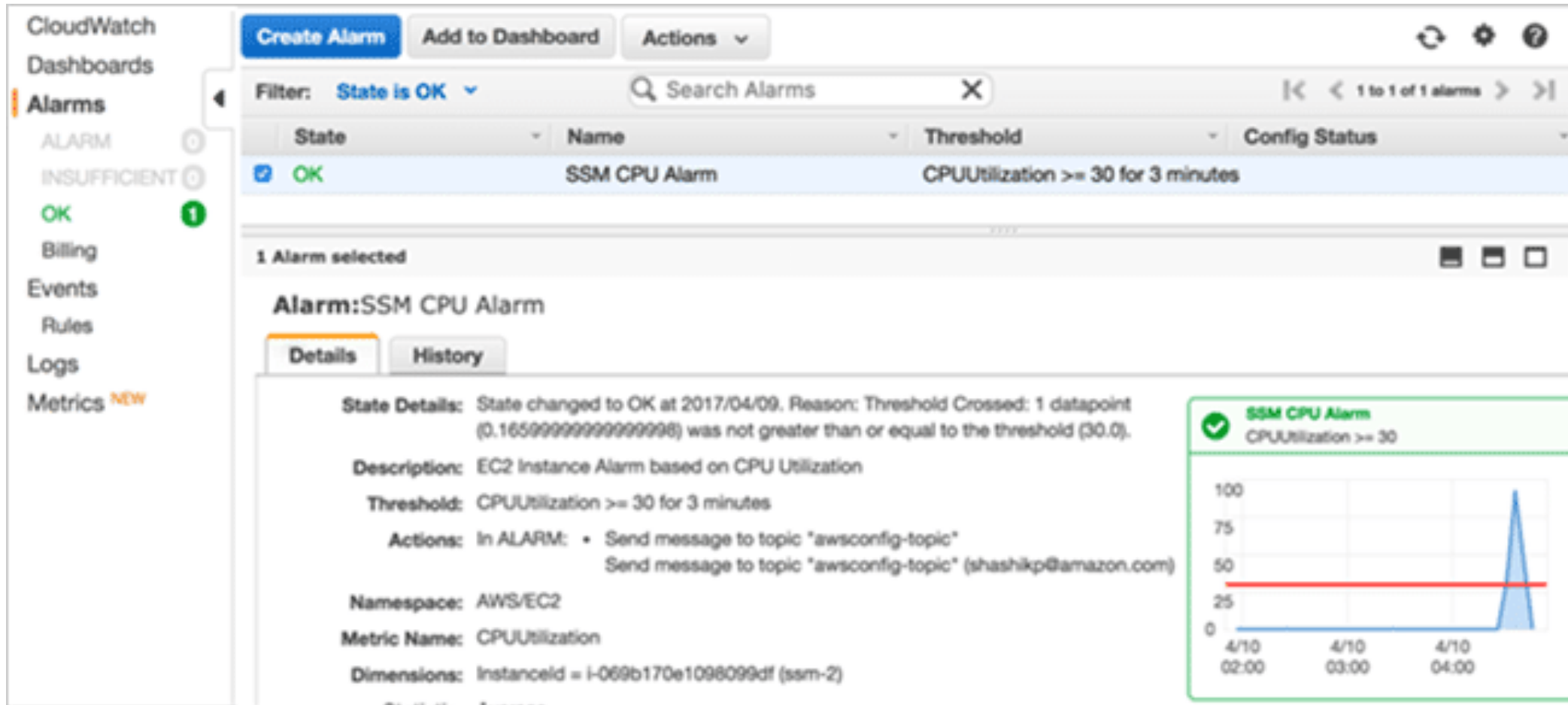
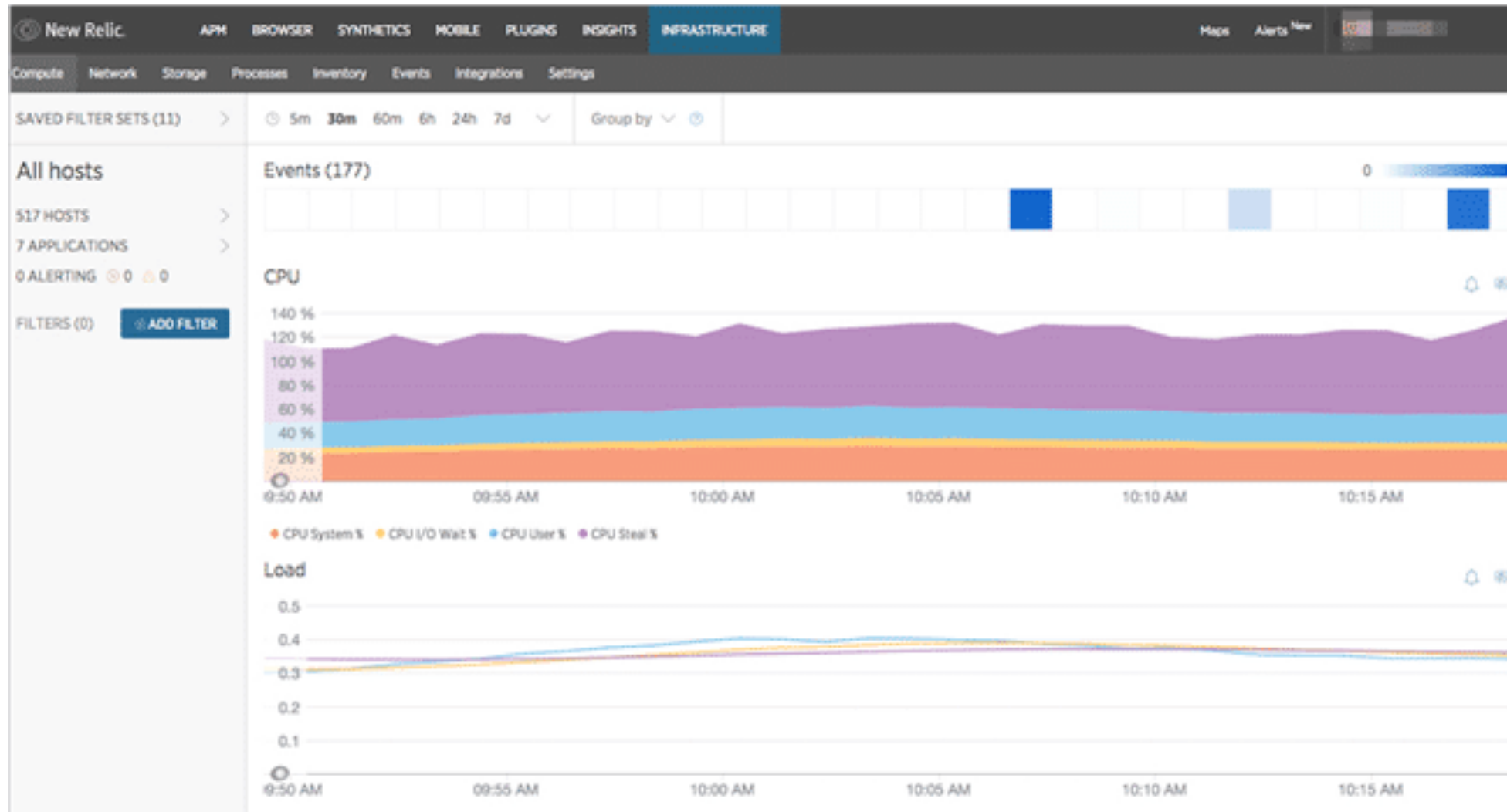# Recall a possible microservice architecture

Gets complex

Cloud

Client

Client2

API gateway

Application

Containers

Virtual machines

Virtualization

HW resources

CPU

Memory

Storage

Gets more complex

Cloud

Client

Client2

30s

API gateway

CPU

Memory

Storage

- In your application code?
- In your intrastructure code?

Example: Amazon CloudWatch

Example: New Relic

Sometimes separated

Cloud

Client

Client2

API gateway

Service monitoring

Cloud monitoring
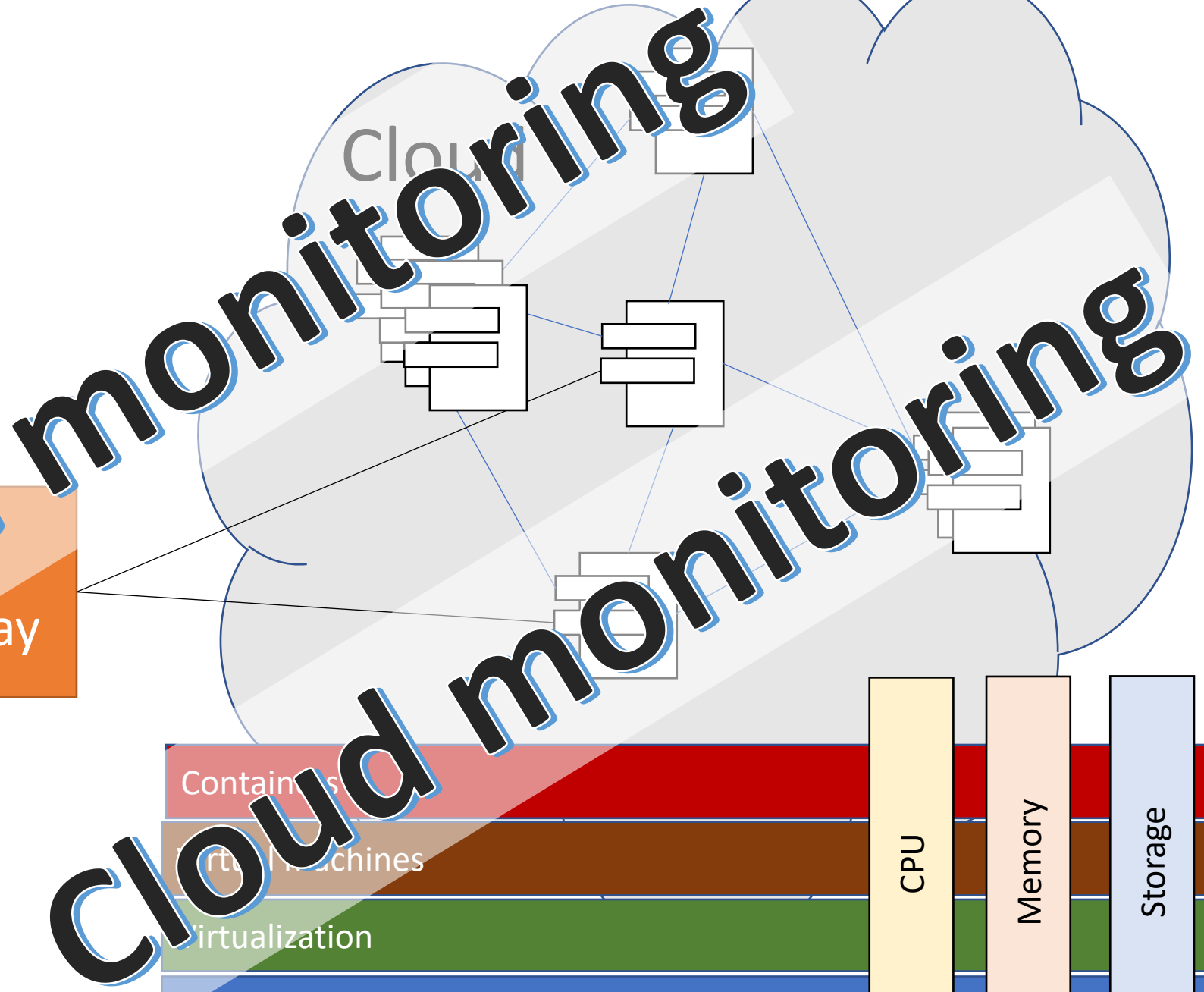
Containers

Virtual machines

Virtualization

HW resources

CPU

Memory

Storage

What might be monitored

- Availability
- MTBF (mean time between failures)
- Throughput
- Response time
- Latency
- Security threats
- Scalability
- Cost per customer
- Usage (recall A/B testing)
- Application specific measures

- *(Optional)* implement monitoring and logging for troubleshooting. This should be a separate service that the user can use through browser. It should show at least start time of the service, number of requests it has received after start.

- Waiting for creative solutions !

Couple of cloud quality "terms"

- QoS (Quality of Service): measure of capacity, performance etc.

- SLA (Service Level Agreement): an agreement between provider client about capacity, performance etc.
  - Or at least promise

- Codifies the specific parameters and minimum levels required for each element of the service, as well as remedies for failure to meet those requirements.

- Affirms your institution's ownership of its data stored on the service provider's system, and specifies your rights to get it back.

- Details the system infrastructure and security standards to be maintained by the service provider, along with your rights to audit their compliance.

- Specifies your rights and cost to continue and discontinue using the service.

- Availability (e.g. 99.99% during work days, 99.9% for nights/weekends)
- Performance (e.g. maximum response times)
- Security / privacy of the data (e.g. encrypting all stored and transmitted data)
- Disaster Recovery expectations (e.g. worse case recovery commitment)
- Location of the data (e.g. consistent with local legislation)
- Access to the data (e.g. data retrievable from provider in readable format)
- Portability of the data (e.g. ability to move data to a different provider)
- Process to identify problems and resolution expectations (e.g. call center)
- Change Management process (e.g. changes – updates or new services)
- Dispute mediation process (e.g. escalation process, consequences)
- Exit Strategy with expectations on the provider to ensure smooth transition