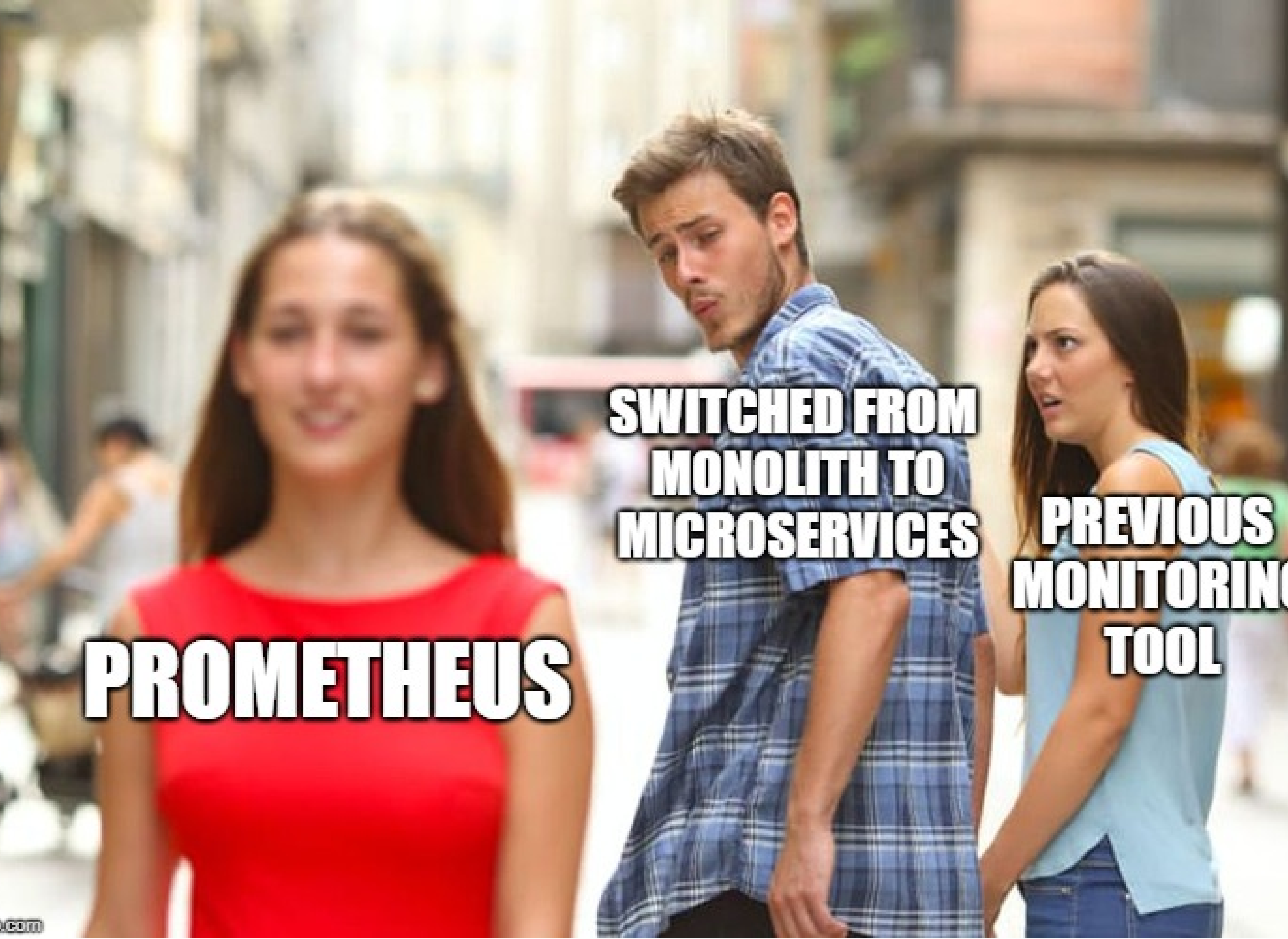
Prometheus for Devs

KubeCon & CloudNativeCon
Copenhagen, Denmark
May 2, 2018
@stroe_bit

About me

Father
DevOps Guy
Freelancer
IaaM Meetup Organizer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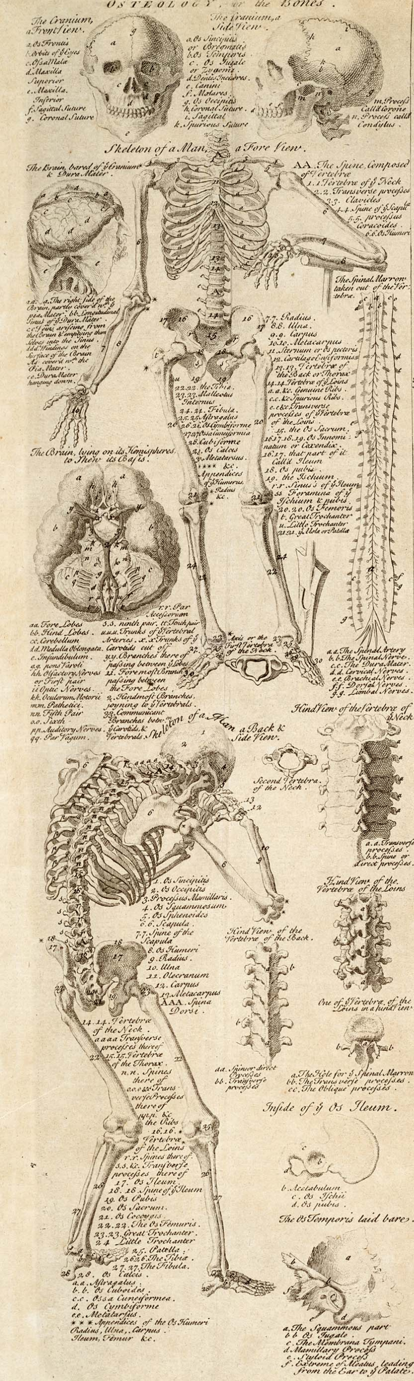
ANATOMY.

OSTEOLOGY, or the Bones.



The Cranium, a Front View.

a. Os Frontis
b. Orbits of yͤ Eyes
c. Os ſa Malæ
d. Maxilla Superior
e. Maxilla Inferior
f. Sagittal Suture
g. Coronal Suture

The Cranium, a Side View.

a. Os Sincipitis or Bregmatis
b. Os Temporis
c. Os Jugale or Zygoma.
d. Dentes Inciſores.
e. Canini
f. Molares.
g. Os Occipitis
h. Coronal Suture.
i. Sagittal
k. Spurious Suture
m. Proceſs Call'd Corone
n. Proceſs call'd Condylus.

Skeleton of a Man, a Fore View.

AA. The Spine, Compoſed of Vertebræ
1.1. Vertebræ of yͤ Neck
2.2. Transverſe proceſses
3.3. Clavicles
4.4. Spine of yͤ Scapula
5.5. proceſsus Coracoides.
6.6. Os Humeri
7.7. Radius.
8.8. Ulna.
9.9. Carpus
10.10. Metacarpus
11. Sternum or Os pectoris
12. Cartilago Enſiformis
13.13. Vertebræ of the Back or Thorax
14.14. Vertebræ of yͤ Loins
a.a.&c. Genuine Ribs.
c.c.&c. Spurious Ribs.
e.e.&c. Transverſe proceſses of yͤ Vertebræ of the Loins.
15. the Os Sacrum.
16.17.18.19. Os Innominatum or Coxendix.
16.17. that part of it Call'd Ileum
18. Os pubis.
19. the Iſchium.
r.r. Sinus's of yͤ Ileum
ss Foramina of yͤ Iſchium & pubis.
20.20. Os Femoris
t. Great Trochanter
u. Little Trochanter
21.21. yͤ Rotula or Patella
22.22. the Tibia.
23.23. Malleolus Internus
24.24. Fibula.
25.25 Aſtragalus
26.26. Os Cymbiforme
27.27. Oſsa Cuneiformia
28. Cubiforme
29. Os Calcis
30. Metatarſus.
**** &c. Appendices of yͤ Humerus, Radius &c.
* Axis or the First Vertebra of the Neck.

The Brain, bared of yͤ Cranium & Dura Mater.

a.a. a. The right ſide of the Brain, partly cover'd wth yͤ pia Mater. bb. Longitudinal Sinus of yͤ Dura Mater. c.c. Sinus ariſing from the Brain & emptying themſelves into the Sinus. d.d.d. Windings on the Surface of the Brain As cover'd wth the Pia Mater. e.e. Dura Mater hanging down.

The Spinal Marrow taken out of the Vertebræ.

a.a. The Spinal Artery
b.b. The Spinal Nerve.
c.c. The Dura Mater.
d.d. Cervical Nerves.
e.e. Brachial Nerves.
f.f. Dorſal Nerves.
g.g. Lumbal Nerves.

The Brain, lying on its Hemiſpheres, to Shew its Baſis.

aa. Fore Lobes
bb. Hind Lobes.
cc. Cerebellum
dd. Medulla Oblongata.
e. Infundibulum.
g.g. pons Varoli
hh. Olfactory Nerves or First pair
ii Optic Nerves.
kk. Oculorum Motorii
mm. Pathetici.
nn. Fifth Pair
o.o. Sixth
pp. Auditory Nerves.
qq. Par Vagum.
r.r. Par Acceſsorium
s.s. ninth pair. tt. Tenth pair
u.u.u. Trunks of yͤ Vertebral Arteries. x.x Trunks of yͤ Carotids cut off
y.y. Branches thereof paſsing between yͤ Lobes.
11. Foremost Branch paſsing between the Fore Lobes.
2. Hindmost Branches, joyning to yͤ Vertebrals.
33. Communicant Branches betw. yͤ Carotids, & Vertebrals.

Skeleton of a Man a Back & Side View.

1. Os Sincipitis
2. Os Occipitis
3. Proceſsus Mamillaris.
4. Os Squammoſum
5. Os Sphenoides
6.6. Scapula.
7.7. Spine of the Scapula
8. Os Humeri
9. Radius.
10. Ulna.
11. Olecranum
12. Carpus
13. Metacarpus
AAA. Spina Dorsi.
14.14. Vertebræ of the Neck.
a a a a Tranſverſe proceſses thereof
15.15. Vertebræ of the Thorax.
n.n. Spines thereof
o.o.o &c. Trans verſe Proceſses thereof
p.p.p. &c the Ribs
16.16. Vertebræ of the Loins
r.r. Spines thereof.
s.s. &c. Tranſverſe proceſses thereof
17. Os Ileum.
18.18 Spine of yͤ Ileum
19. Os Pubis
20. Os Sacrum.
21. Os Coccygis.
22.22. The Os Femoris.
23.23. Great Trochanter.
24 Little Trochanter
25. Patella.
26.26. The Tibia.
27.27. The Fibula.
28.28. Os Calcis.
a.a. Aſtragalus.
b.b. Os Cuboides.
c.c. Oſsa Cuneiformea.
d. Os Cymbiforme
e.e. Metatarſus.
* * * Appendices of the Os Humeri Radius, Ulna, Carpus. Ileum, Femur &c.

Second Vertebra of the Neck.

Hind View of the Vertebræ of yͤ Neck

a.a. Tranſverſe proceſses.
b.b. Spine or direct proceſses.

Hind View of the Vertebræ of the Loins

Hind View of the Vertebræ of the Back.

aa. Spines or direct Proceſses
bb. Tranſverſe proceſses

One of yͤ Vertebræ of the Loins in a hind View.

a. The Hole for yͤ Spinal Marrow
bb. The Trans verſe proceſses.
cc. The Oblique proceſses.

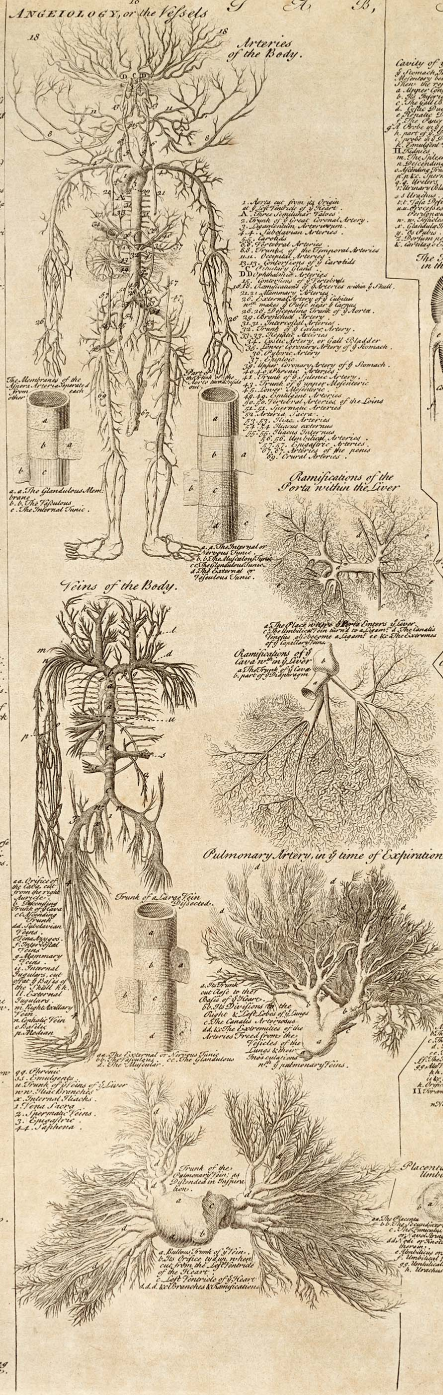
Inside of yͤ Os Ileum.

b. Acetabulum
c. Os Iſchii
d. Os pubis.

The Os Temporis laid bare.

a. The Squammous part
b b Os Jugale.
c. The Membrana Tympani.
d. Mamillary Proceſs
e. Styloid Proceſs
f. Extreme of Meatus, leading from the Ear to yͤ Palate.

ANGEIOLOGY, or the Veſsels



Arteries of the Body.

1. Aorta cut from its Origin at yͤ Left Ventricle of yͤ Heart.
A. Three Semilunar Valves
2. Trunk of yͤ Great Coronal Artery.
3. Ligamentum Arteriorum.
4.4. Subclavian Arteries.
5.5. Carotids
6.6. Vertebral Arteries.
8.8. Trunks of the Temporal Arteries
11.11. Occipital Arteries
13.13. Contorſions of yͤ Carotids
C. Pituitary Gland.
DD Ophthalmic Arteries
15. Contorſions of yͤ Vertebrals
18.18. Ramifications of yͤ Arteries within yͤ Skull.
21.21 Mammary Arteries.
26. External Artery of yͤ Cubitus wch makes yͤ Pulse near yͤ Carpus
28.28. Deſcending Trunk of yͤ Aorta.
29. Bronchial Artery
31.31. Intercostal Arteries.
32. Trunk of yͤ Cœliac Artery.
33.33. Hepatic Arteries.
34. Cystic Artery, or Gall-Bladder
35. Lower Coronary Artery of yͤ Stomach.
36. Pyloric Artery
37. Epiploic
39. Upper Coronary Artery of yͤ Stomach.
40.40. Phrenic Arteries.
41. Trunk of yͤ Splenic Artery.
43. Trunk of yͤ upper Meſenteric
45. Lower Meſenteric.
49.49. Emulgent Arteries.
50.50. Vertebral Arteries of the Loins
51.51. Spermatic Arteries
52. Arteria Sacra.
53.53. Iliac Arteries
54.54 Iliacus externus
55.55. Iliacus Internus
56.56. Umbilical Arteries.
57.57. Epigaſtric Arteries.
67.67. Arteries of the penis
69. Crural Arteries.

The Membranes of the Aſpera Arteria Seperated from each other

a. a. The Glandulous Membrane
b. b. The Vaſculous
c. The Internal Tunic.

Part of the Trunk of the Aorta turn'd inſide out.

a. a. The Internal or Nervous Tunic.
b. b. The Muſculous Tunic
c.c. The Glandulous Tunic.
d. The External or Vaſculous Tunic.

Ramifications of the Porta within the Liver

a. The Place where yͤ Porta Enters yͤ Liver. c. The Umbilical Vein turn'd to a Ligamt. d. The Canalis Venoſus alſo become a Ligamt. ee &c. The Extremes of yͤ Capillary Veins.

Ramifications of yͤ Cava wth in yͤ Liver

a. The Trunk of yͤ Cava.
b. part of yͤ Diaphragm

Veins of the Body.

aa. Orifice of the Cava cut from the right Auricle.
b. Deſcending Trunk of yͤ Cava
cc. Aſcending Trunk
dd. Subclavian Veins.
e. Vena Azygos.
f. Intercoſtal Veins
g. Mammary Veins.
ii. Internal Jugulars, cut off at yͤ Baſis of the Skull kk.
ll. External Jugulars.
m. Right Axillary Vein
n. Cephalic Vein
o. Baſilic
p. Median
qq. Phrenic
ss. Emulgents
u. Trunk of yͤ Veins of yͤ Liver
w w. Iliac Branches
x. Internal Iliacks.
1. Vena Sacra
2. Spermatic Veins.
3. Epigaſtric
4.4. Saphena.

Trunk of a Large Vein Diſsected.

aa. The External or Nervous Tunic
bb. The Vaſculous. cc. The Glandulous
d. The Muſcular.

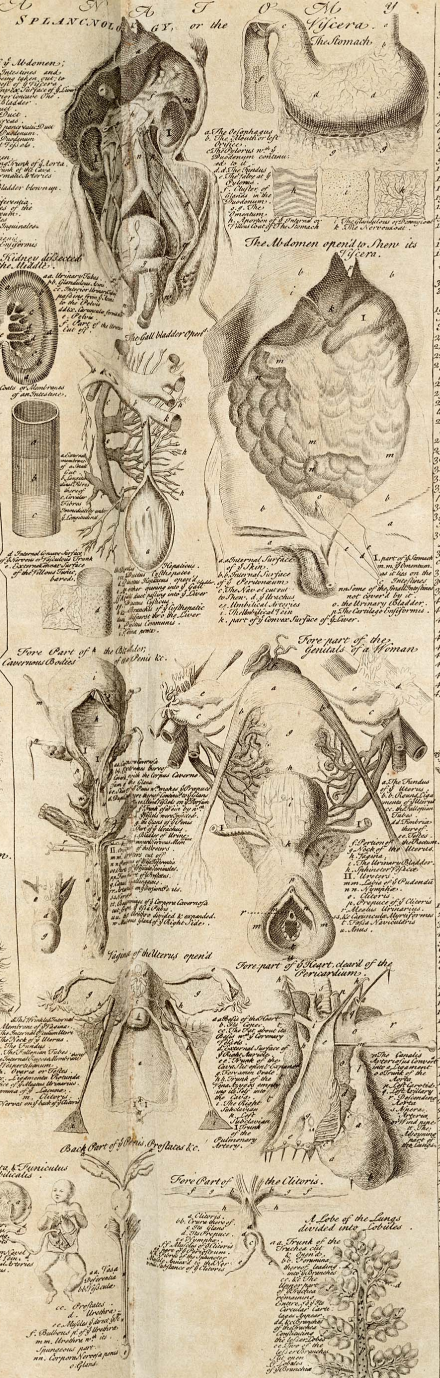
Pulmonary Artery, in yͤ time of Expiration.

a. Its Trunk cut Cloſe to the Baſis of yͤ Heart.
bb. Its Divisions to the Right & Left Lobes of yͤ Lungs
c. The Canalis Arterioſus
dd. &c. The Extremities of the Arteries Freed from the Veſicles of the Lungs & their Anaſtomoſes with yͤ pulmonary Veins.

Trunk of the Pulmonary Vein, as Diſtended in Inſpiration.

a. Bullous Trunk of yͤ Vein.
b. Its Orifice ty'd up, when cut from the Left Ventricle of the Heart.
c. Left Ventricle of yͤ Heart
d.d.d. &c. Branches & Ramifications.

SPLANCNOLOGY, or the Viſcera.



Cavity of yͤ Abdomen;

yͤ Stomach, Inteſtines and Meſentery being taken out; to Shew the reſt of yͤ Viſcera
a. Upper Convex Surface of yͤ Liver
b. Its Inferior Concave One.
c. The Gall Bladder.
d. Cyſtic Duct
e. Hepatic Duct.
f. The Pancreas.
g. A Probe in yͤ pancreatic Duct
h. part of yͤ Duodenum.
i. probe in yͤ Duodenum
k. Emulgent Veſsels.
II. Kidnies.
m. The Spleen.
n. Deſcending Trunk of yͤ Aorta.
o. Aſcending Trunk of the Cava
p. p. &c. Spermatic Arteries
q. q. Ureters
r. Urinary Bladder blown up.
s Urachus.
t. t. Vaſa Deferentia.
u.u. Proceſses of the Peritonæum.
w. w. Teſticles
x. Glandulæ Inguinales.
y. Os Pubis.
z. Dorſum penis.
&. Cartilago Enſiformis

The Stomach

a. The Oeſophagus
b. The Mouth or left Orifice.
c. The Pylorus wth yͤ Duodenum continu:ed to it
d.d. The Fundus
e. The Valve at yͤ Pylorus.
f. Cluster of Glands in the Duodenum.
g.g. The Omentum
h. A portion of yͤ Internal or Villous Coat of The Stomach
i. The Glandulous or Downy Coat
k. The Nervous Coat.

The Kidney diſsected in the Middle

aa. Urinary Tubes.
bb. Glandulous Acini
cc. Interior Urinary Tubes paſsing from yͤ Acini to the Pelvis
dd &c. Carunculæ formed
e. Pelvis.
f. Part of the Ureter cut off.

Coats or Membranes of an Inteſtine.

a. External membrane of a Small Gut
b. Longitudinal Fibres thereof
c. Circular Fibres Immediately under yͤ Longitudinal
d. Internal Concave Surface of yͤ Nervous or Vaſculous Trunk
e. External Convex Surface of the Villous Tunic, bared.

The Gall bladder Open'd.

bb. Ductus Hepaticus.
cc. Ductus Cyſthepatici
d. Ductus Hepaticus open'd
e. other opening into yͤ Gall bladder.
f. yͤ Gall duct paſsing into yͤ Liver
g. Ductus Cyſticus.
h. Branches of yͤ Cyſthepatic diſperſt thro the Liver
k. Ductus Communis.
l. Vena porta.

The Abdomen open'd to Shew its Viſcera.

a. a. Internal Surface of yͤ Skin.
b. b. Internal Surface of yͤ Peritonæum
c. The Navel cut out to Shew. d. yͤ Urachus
e.e. Umbilical Arteries
i. The Umbilical Vein
k. part of yͤ Convex Surface of yͤ Liver.
I. part of yͤ Stomach
m. m. yͤ Omentum. as it lies on the Inteſtines
nn Some of the ſmall Inteſtines not cover'd by it.
o. the Urinary Bladder.
p. The Cartilago Enſiformis.

Fore Part of the Bladder, Cavernous Bodies of the Penis &c.

aa. Corpora Cavernoſa
bb. Extremes thereof Cover'd with the Corpus Cavernoſum of the Glans
c. Septum of yͤ Penis wch makes yͤ Prepuce
d. Duplicature thereof Continu'd to yͤ Glans
ee. Blood Veſsels on yͤ Dorſum
f. Trunk of a Vein by wch Veſsels were Injected.
g. the Glans of yͤ Penis
h. Part of yͤ Urachus
i. Bladder of Urine
k. Inward Nervous Membrane
ll. Orifices of the Ureters.
mm. Ureters cut off
n n Portions of Vaſa Deferentia
oo Parts of yͤ Veſiculæ Seminales.
pp. Fore part of yͤ Proſtates.
q. Caput Gallinaginis.
rr. Arteries on yͤ Dorſum Penis.
ss. Nerves
tt. Beginnings of yͤ Corpora Cavernoſa cut from yͤ Oſsa Pubis
u.u. yͤ Urethra divided & expanded.
w Mucous Gland of yͤ Right Side.

Fore-part of the Genitals of a Woman

a. The Fundus of yͤ Uterus.
b. b. Round Ligaments of yͤ Uterus
cc. the Fallopian Tubes
dd. Fimbriæ thereof.
ee. Teſtes.
f. Portion of the Rectum.
g. Neck of the Uterus.
h. Vagina.
i. The Urinary Bladder.
k. Sphincter Veſicæ
II. Ureters.
mm. Labia of yͤ Pudendũ
n n. Nymphæ.
o. Clitoris.
p. Prepuce of yͤ Clitoris
r. Meatus Urinarius.
ss. &c. Carunculæ Myrtiformes
t. Foſsa Navicularis
u. Anus.

Vagina of the Uterus open'd

a. The Wrinkled Internal Membrane of yͤ Vagina.
b. The Internal Oſculum Uteri
c. The Neck of yͤ Uterus.
d. The Fundus
ee. The Fallopian Tubes.
ff. The Internal Orifices thereof
gg. Alæ Veſpertilionum
hh. Ovaria or Teſtes
ii &c. Ligamenta Rotunda
k. Orifice of yͤ Meatus Urinarius.
II Foramina of yͤ Lacunæ
m. Clitoris.
n Nerves on yͤ back of yͤ Clitoris

Fore-part of yͤ Heart, clear'd of the Pericardium.

a a. Baſis of the Heart
b. Its Cone.
cc. The Fat about its Baſis wth yͤ Coronary Veſsels.
d. External Surface of yͤ Right Auricle.
ee. Trunk of the Cava Slit open & Expanded
g. Foramen Ovale.
h h. Trunk of the Vena Azygos emptying its Self into the Cava.
i. The Right Subclavian
k. Left Subclavian
l Trunk of the Pulmonary Artery.
n The Canalis Arterioſus Converted into a Ligament
o o Trunk of the Aorta
p. Left Carotid.
q. Left Axillary
r. Deſcending Aorta
s. Aſpera Arteria or Wind pipe.
tt. The Adjoyning part of the Lungs.

Placenta & Funiculus Umbilicalis.

aa. The Placenta
b b. The Secundices.
c. The Funiculus, or Navel String.
dd. Nodi or Knots therein.
e. Umbilicus or Navel
f. Umbilical Vein.
gg. Umbilical Arteries
h. Urachus.

Back Part of yͤ Penis, Proſtates &c.

a a. Vaſa Deferentia
bb. Veſiculæ
cc. Proſtates
d. Urethra
e e Muſcles of yͤ direct yͤ Penis
f. Bulbous pt. of yͤ Urethra.
mm. Urethra wth its Spungeous part.
nn. Corpora Nervoſa penis
o. Glans.

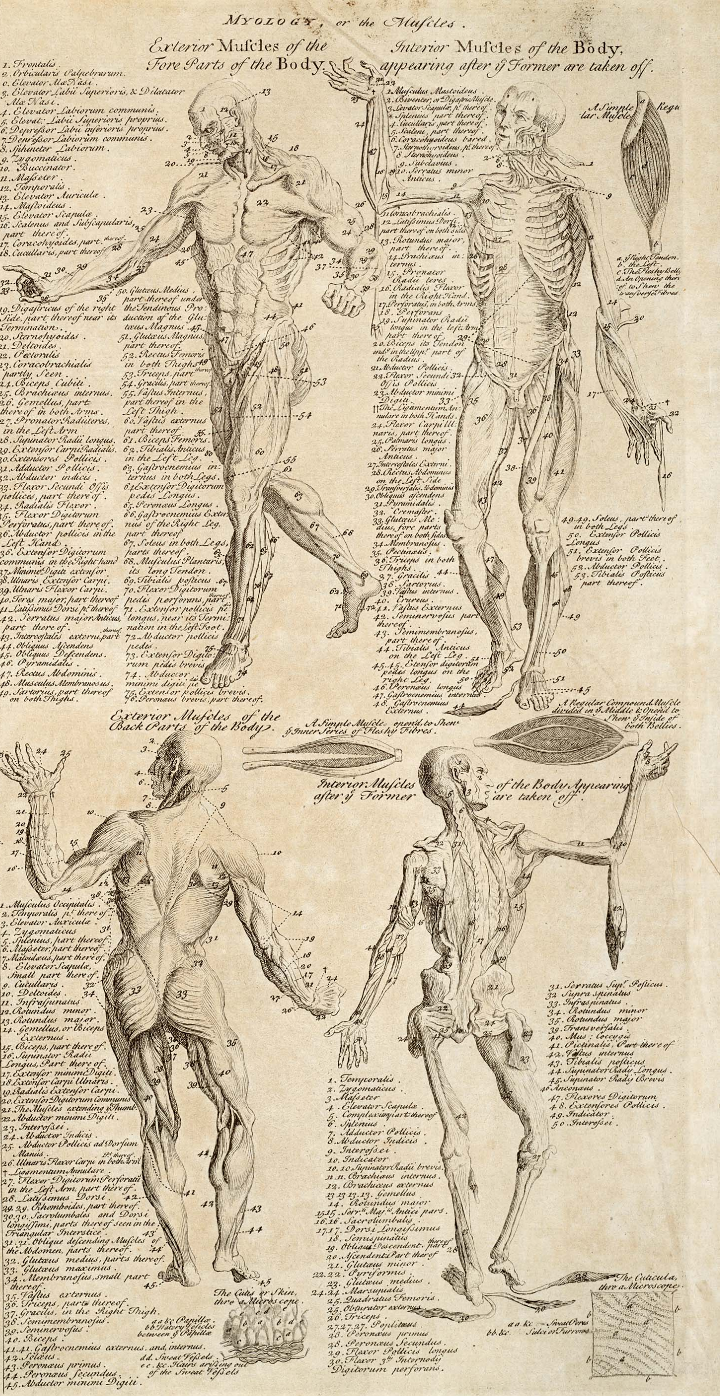
Fore Part of the Clitoris.

a. Clitoris.
bb. Crura thereof.
c Its Glans
d. Its Prepuce.
ee Nymphæ.
ff. Muſcles of yͤ Clitoris
g. part of yͤ Perioſteum.
h. Fibres of the Sphincter Muſcle Annex'd to the Nervous Subſtance of yͤ Clitoris

A Lobe of the Lungs divided into Lobules.

a a. Trunk of the Trachea cut & Open'd.
bb. Foramina thereof, leading into yͤ Bronchia
cc. &c. The Upper part of yͤ Trachea remaining Entire, & yͤ Its Circular Cartilages Appear.
dd. &c. Branches of the Trachea Conſtituting the leſser Lobes
ee. Two of the leſser Branches Slit open
ff. Lobules of yͤ Bronchia

MYOLOGY, or the Muſcles.



Exterior Muſcles of the Fore Parts of the Body.

1. Frontalis.
2. Orbicularis Palpebrarum.
o. Elevator Alæ Naſi.
3. Elevator Labii Superioris, & Dilatator Alæ Naſi.
4. Elevator Labiorum communis.
5. Elevat: Labii Superioris proprius.
6. Depreſsor Labii inferioris proprius.
7. Depreſsor Labiorum communis.
8. Sphincter Labiorum.
9. Zygomaticus.
10. Buccinator.
11. Maſseter.
12. Temporalis.
13. Elevator Auriculæ.
14. Maſtoideus.
15. Elevator Scapulæ.
16. Scalenus and Subſcapularis, part thereof.
17. Coracohyoides, part thereof.
18. Cucullaris, part thereof.
19. Digaſtricus of the right Side, part thereof near its Termination.
20. Sternohyoides.
21. Deltoides.
22. Pectoralis
23. Coracobrachialis partly Seen.
24. Biceps Cubiti.
25. Brachiæus internus.
26. Gemellus, part thereof in both Arms.
27. Pronator Radii teres, in the Left Arm
28. Supinator Radii longus.
29. Extenſor Carpi Radialis.
30. Extenſores Pollicis.
31. Adductor Pollicis.
32. Abductor indicis.
33. Flexor Secundi Oſsis pollicis, part thereof.
34. Radialis Flexor.
35. Flexor Digitorum Perforatus, part thereof.
36. Abductor pollicis in the Left Hand.
36. Extenſor Digitorum communis in the Right hand
37. Minimi Digiti extenſor
38. Ulnaris Extenſor Carpi.
39. Ulnaris Flexor Carpi.
40. Teres major, part thereof
41. Latiſsimus Dorſi pt. thereof
42. Serratus major Anticus, part thereof.
43. Intercoſtales externi, part thereof.
44. Obliquus Aſcendens
45. Obliquus Deſcendens.
46. Pyramidalis.
47. Rectus Abdominis.
48. Muſculus Membranoſus.
49. Sartorius, part thereof on both Thighs.
50. Glutæus Medius, part thereof under the Tendinous Production of the Glutæus Magnus.
51. Glutæus Magnus, part thereof.
52. Rectus Femoris in both Thighs.
53. Triceps, part thereof.
54. Gracilis, part thereof.
55. Vaſtus Internus, part thereof in the Left Thigh.
60. Vaſtus externus part thereof.
61. Biceps Femoris.
62. Tibialis Anticus in the Left Leg.
63. Gaſtrocnemius internus in both Legs.
64. Extenſor Digitorum pedis Longus.
65. Peronæus Longus.
66. Gaſtrocnemius Externus of the Right Leg, part thereof.
67. Soleus in both Legs, parts thereof.
68. Muſculus Plantaris, its long Tendon.
69. Tibialis poſticus.
70. Flexor Digitorum pedis perforans, part thereof.
71. Extenſor pollicis pedis longus, near its Termination in the Left Foot.
72. Abductor pollicis pedis.
73. Extenſor Digitorum pedis brevis.
74. Abductor minimi digiti pedis.
75. Extenſor pollicis brevis.
76. Peronæus brevis, part thereof.

Interior Muſcles of the Body, appearing after yͤ Former are taken off.

1. Muſculus Maſtoideus.
2. Biventer, or Digaſtric Muſcle.
3. Levator Scapulæ, pt. thereof.
* Splenius part thereof.
4. Cucullaris, part thereof.
5. Scaleni, part thereof.
6. Coracohyoideus bared.
7. Sternothyroideus, pt. thereof
8. Sternohyoideus.
9. Subclavius.
10. Serratus minor Anticus.
11. Coracobrachialis.
12. Latiſsimus Dorſi part thereof on both ſides.
13. Rotundus major, part thereof.
14. Brachiæus internus.
15. Pronator Radii teres.
16. Radialis Flexor in the Right Hand.
17. Perforatus, in both Arms.
18. Perforans
19. Supinator Radii longus in the left Arm part thereof.
20. Biceps its Tendon ends in the Uppr. part of the Radius.
21. Abductor Pollicis.
22. Flexor Secundi Oſsis Pollicis
23. Abductor minimi Digiti
†† The Ligamentum Annulare in both Hands.
24. Flexor Carpi Ulnaris, part thereof.
25. Palmaris longus.
26. Serratus major Anticus.
27. Intercoſtales Externi.
28. Rectus Abdominus on the Left Side
29. Tranſverſalis Abdominis
30. Obliquus aſcendens
31. Pyramidalis.
32. Cremaſter.
33. Glutæus Medius, fore parts thereof on both ſides.
34. Membranoſus.
35. Pectinæus.
36. Triceps in both Thighs.
37. Gracilis.
38. Sartorius.
39. Vaſtus internus.
40. Crureus.
41. Vaſtus Externus
42. Seminervoſus part thereof.
43. Semimembranoſus, part thereof.
44. Tibialis Anticus on the Left Leg.
45.45. Extenſor digitorum pedis longus on the right Leg.
46. Peronæus longus
47. Gaſtrocnemius internus
48. Gaſtrocnemius Externus.
49.49. Soleus, part thereof in both Legs.
50. Extenſor Pollicis Longus.
51. Extenſor Pollicis brevis in both Feet.
52. Abductor Pollicis.
53. Tibialis Poſticus part thereof.

A Simple Regular Muſcle

a. yͤ Right Tendon.
b. the Left.
c. The Fleshy Belly
d. An Opening thereof to Shew the tranſverſe Fibres

A Simple Muſcle open'd, to Shew yͤ Inner Series of Fleshy Fibres.

A Regular Compound Muſcle divided in yͤ Middle & Open'd to Shew yͤ Inſide of both Bellies.

Exterior Muſcles of the Back Parts of the Body.

1. Muſculus Occipitalis.
2. Temporalis pt. thereof.
3. Elevator Auriculæ.
4. Zygomaticus
5. Splenius, part thereof.
6. Maſseter, part thereof.
7. Maſtoideus, part thereof.
8. Elevator Scapulæ, Small part thereof.
9. Cucullaris.
10. Deltoides.
11. Infraſpinatus.
12. Rotundus minor.
13. Rotundus major.
14. Gemellus, or Biceps Externus.
15. Biceps, part thereof.
16. Supinator Radii Longus, Part thereof.
17. Extenſor minimi Digiti.
18. Extenſor Carpi Ulnaris.
19. Radialis Extenſor Carpi.
20. Extenſor Digitorum Communis
21. The Muſcles extending yͤ Thumb.
22. Abductor minimi Digiti
23. Interoſsei.
24. Abductor Indicis.
25. Abductor Pollicis ad Dorſum Manus.
26. Ulnaris Flexor Carpi in both Arms pt. thereof.
† Ligamentum Annulare.
27. Flexor Digitorum Perforatii in the Left Arm, part thereof.
28. Latiſsimus Dorſi.
29.29. Rhomboides, part thereof.
30.30. Sacrolumbales and Dorſi longiſsimi, parts thereof seen in the Triangular Interſtice.
31.31. Oblique deſcending Muſcles of the Abdomen, parts thereof.
32. Glutæus medius, parts thereof.
33. Glutæus maximus.
34. Membranoſus, small part thereof.
35. Vaſtus externus.
36. Triceps, parts thereof.
37. Gracilis, in the Right Thigh.
38. Semimembranoſus.
39. Seminervoſus.
40. Biceps.
41.41. Gaſtrocnemius externus, and, internus.
42. Solæus.
43. Peronæus primus.
44. Peronæus ſecundus.
45. Abductor minimi Digiti.

Interior Muſcles of the Body Appearing after yͤ Former are taken off.

1. Temporalis.
2. Zygomaticus.
3. Maſseter
4. Elevator Scapulæ.
5. Complexus, part thereof
6. Splenius.
7. Adductor Pollicis.
8. Abductor Indicis.
9. Interoſsei.
10. Indicator
10.10 Supinator Radii brevis.
11.11. Brachiæus internus.
12. Brachiæus externus
13.13 13.13. Gemellus
14. Rotundus major
15.15. Serr. Majr. Antici pars.
16.16. Sacrolumbalis.
17.17. Dorſi Longiſsimus
18. Semiſpinatus
19. Obliqui Deſcendent. part thereof
20. Aſcendent. Part thereof
21. Glutæus minor.
22.22. Pyriformis.
23. Glutæus medius.
24.24. Marſupialis
25. Quadratus Femoris.
25. Obturator externus
26. Triceps.
27.27.27. Poplitæus
28. Peronæus primus
28. Peronæus Secundus.
29. Flexor Pollicis longus
30. Flexor 3tii Internodii Digitorum perforans.
31. Serratus Supr. Poſticus.
32 Supra ſpinatus
33. Infraſpinatus.
34. Rotundus minor
35. Rotundus major
39. Tranſverſalis.
40. Mus: Coccygis
41. Pectinalis, Part thereof
42. Vaſtus internus
43. Tibialis poſticus
44. Supinator Radii Longus.
45. Supinator Radii Brevis
46 Anconæus.
47. Flexores Digitorum
48. Extenſores Pollicis.
49. Indicator.
50. Interoſsei.

The Cutis or Skin, thro a Microſcope.

a a &c Papillæ
bb. Watery Veſicles between yͤ Papillæ
dd. Sweat Veſsels
ee. &c. Hairs ariſing out of the Sweat Veſsels

The Cuticula, thro a Microſcope.

a a. &c. Sweat Pores
bb. &c. Sulci or Furrows

Prometheus

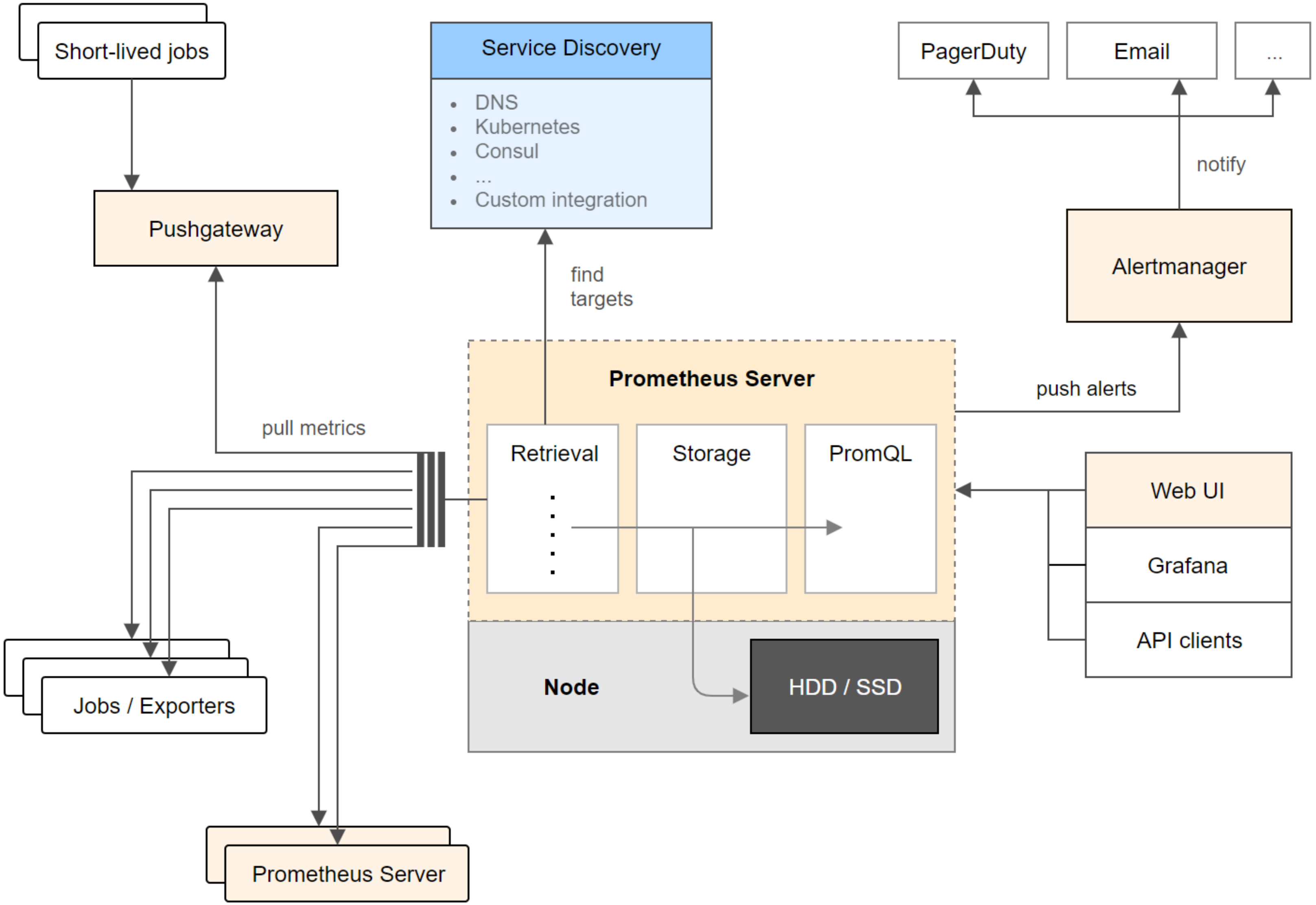
open source

inspired by borgmon

for dynamic environments

pull based

not for logging
not for tracing
not a long-term archival system
no cluster mode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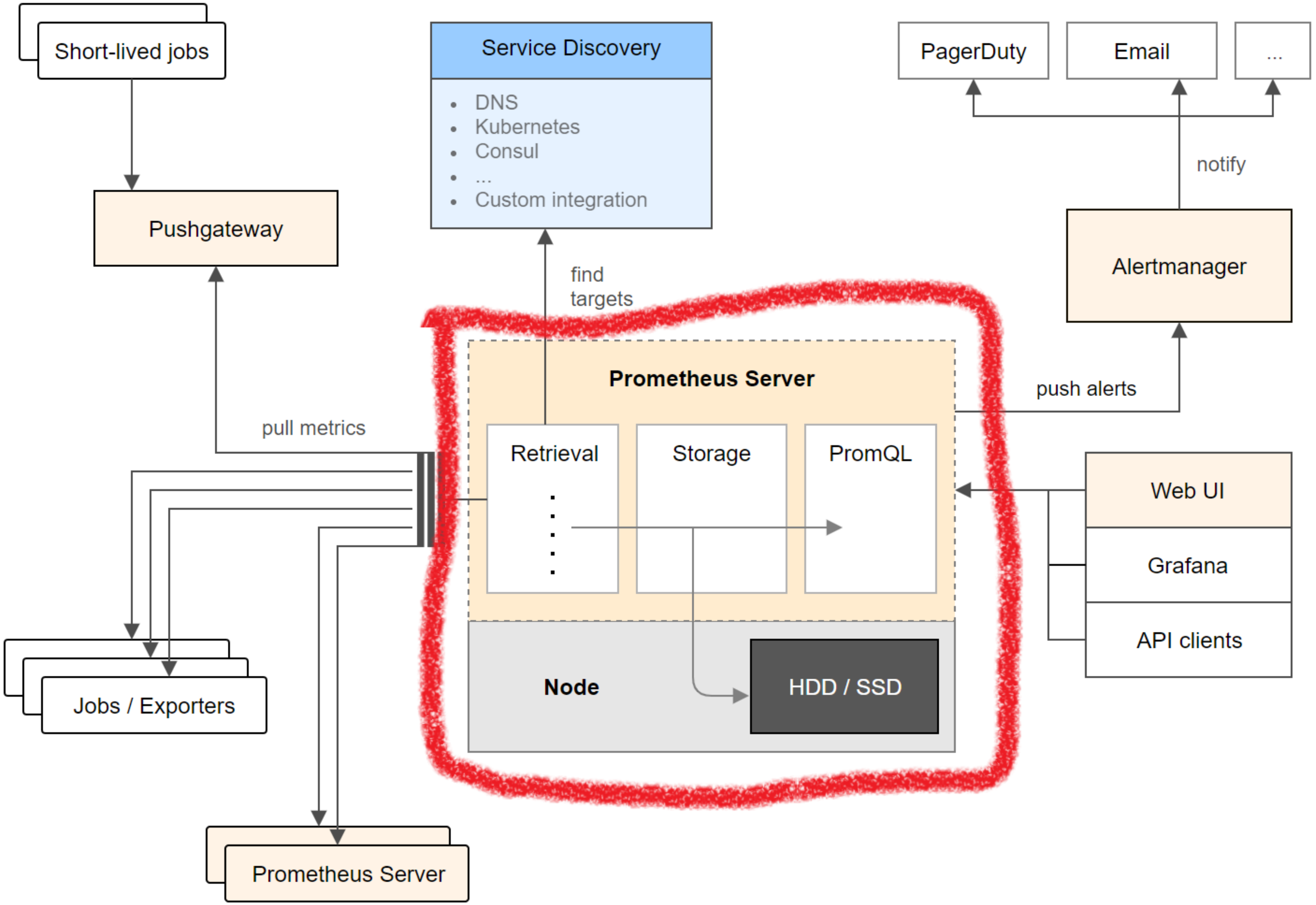
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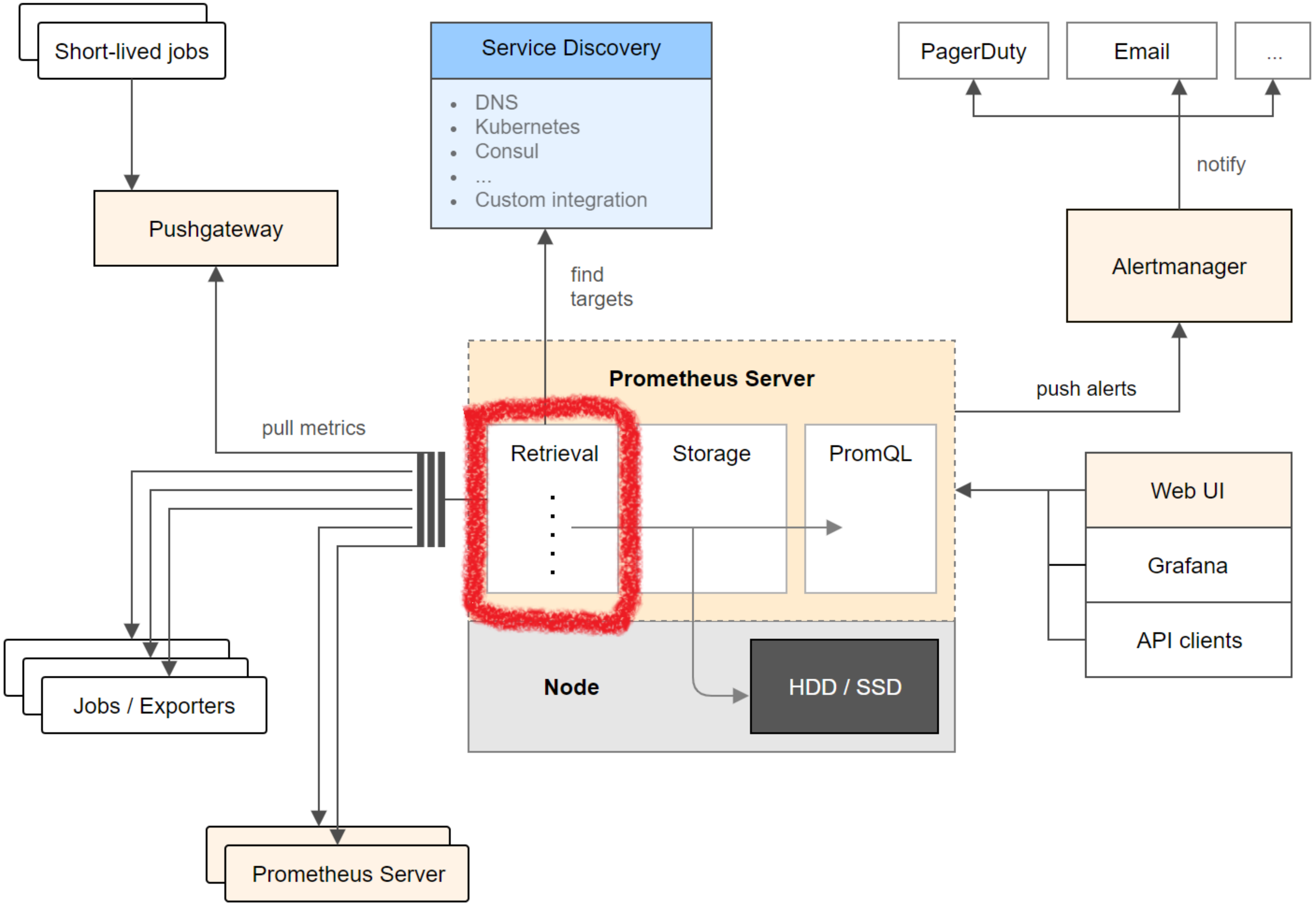
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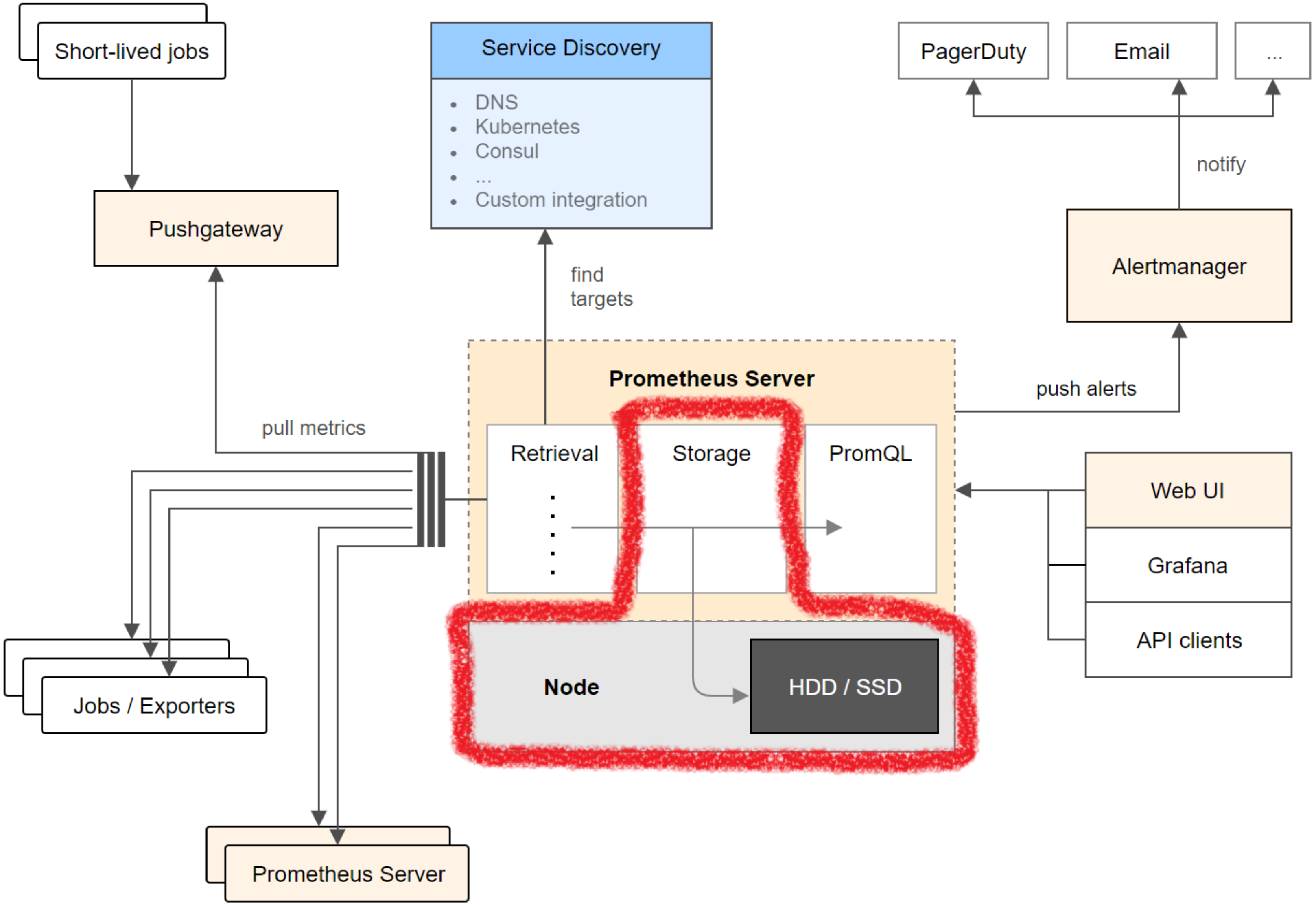
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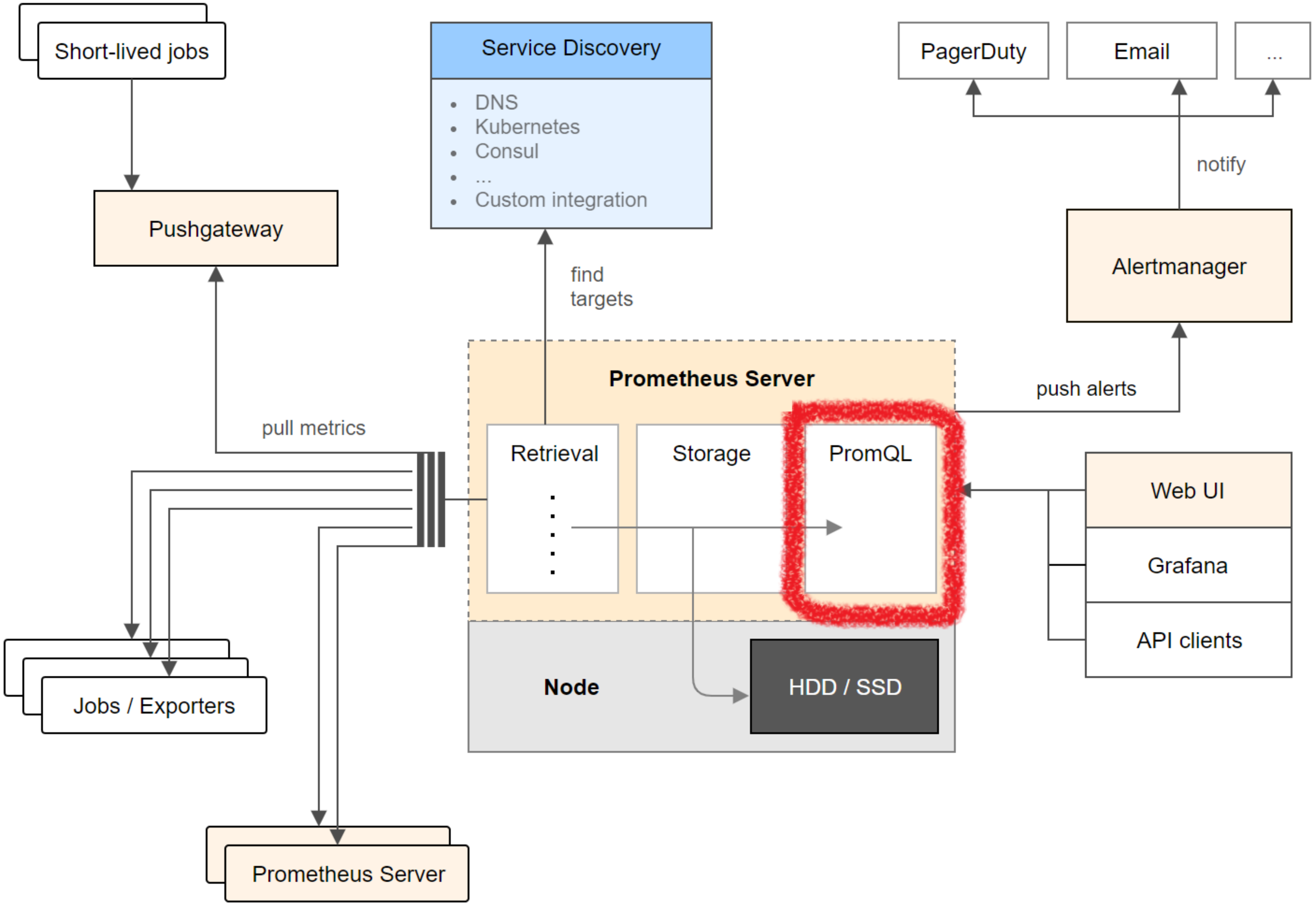
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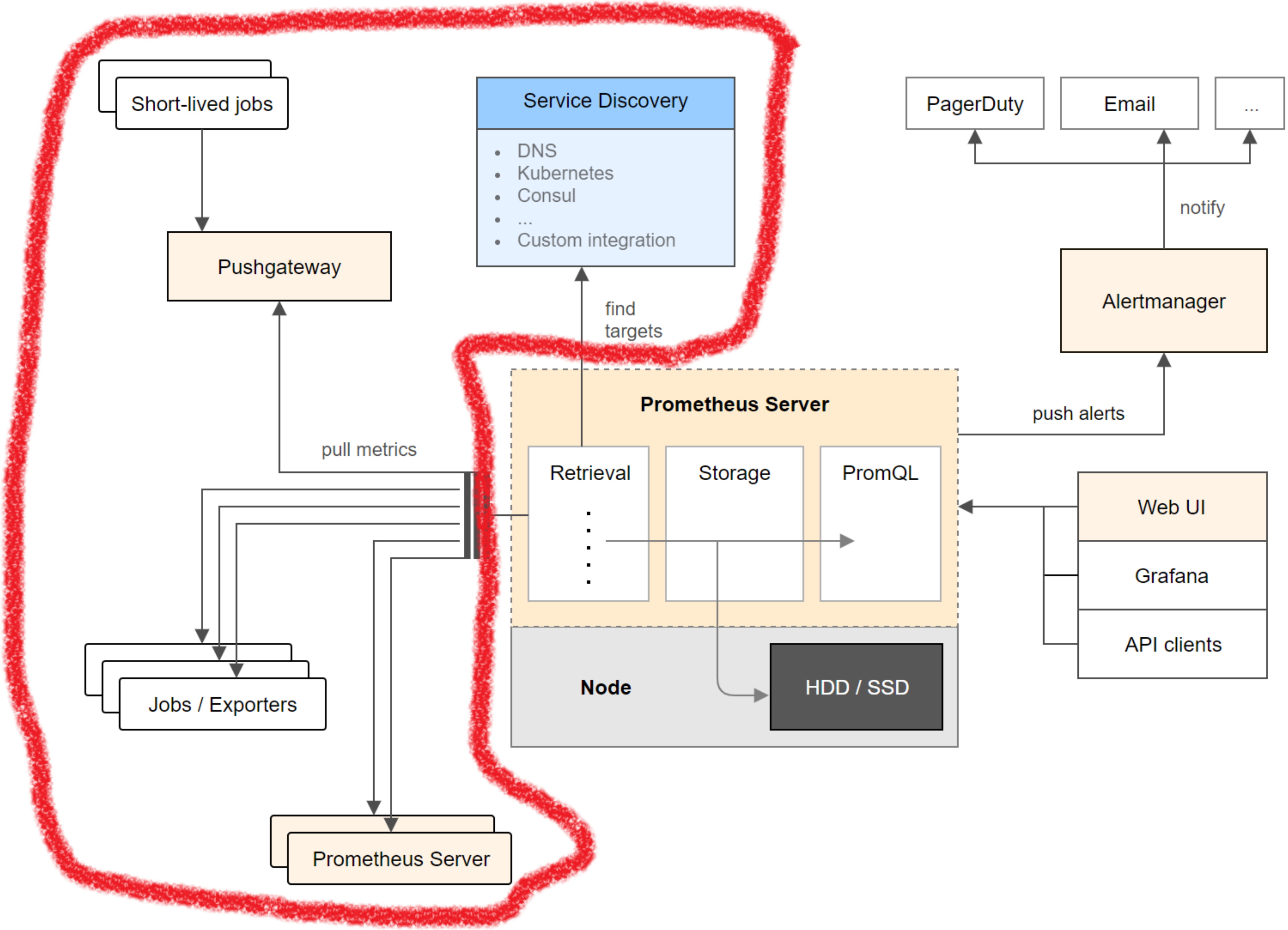
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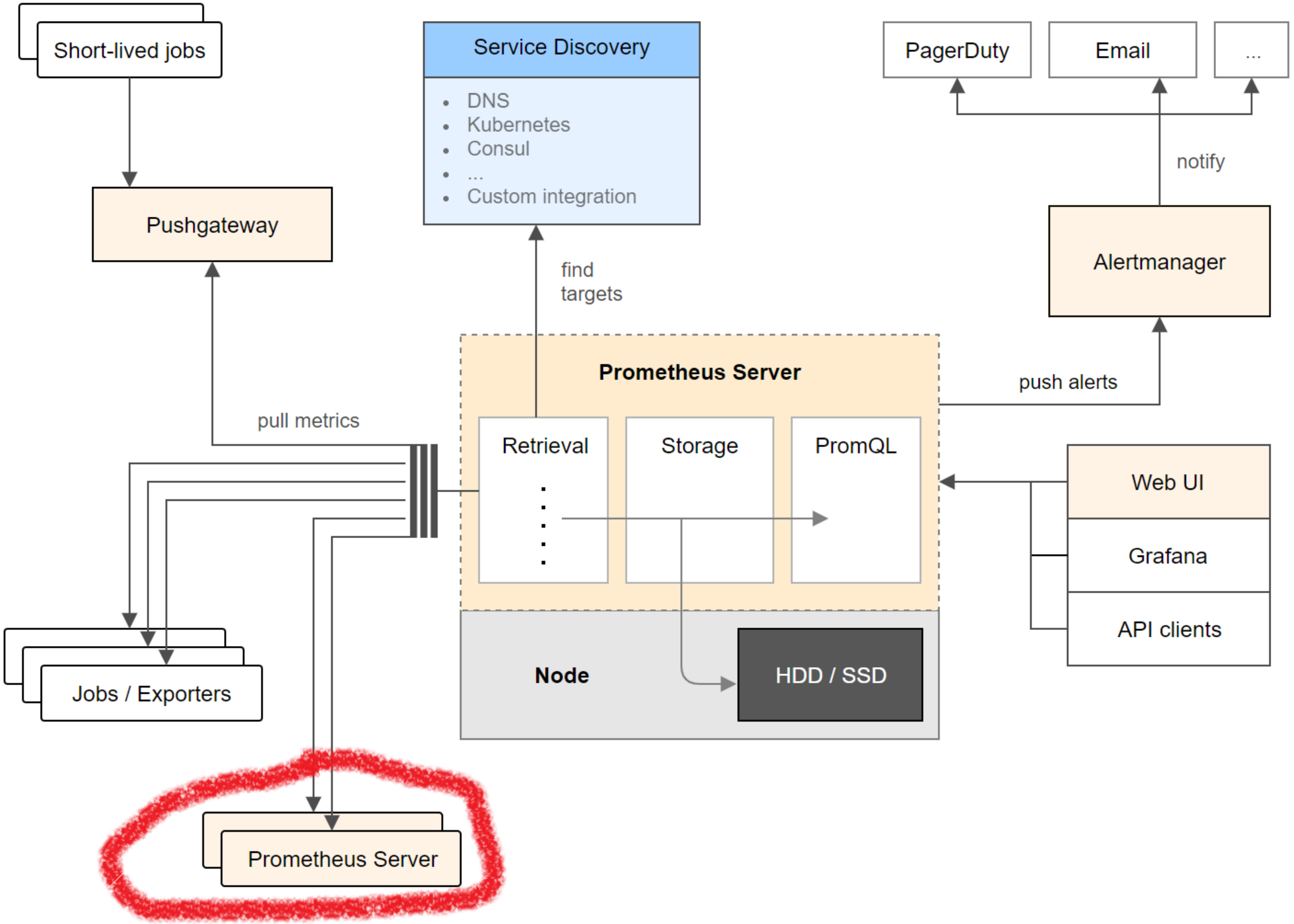

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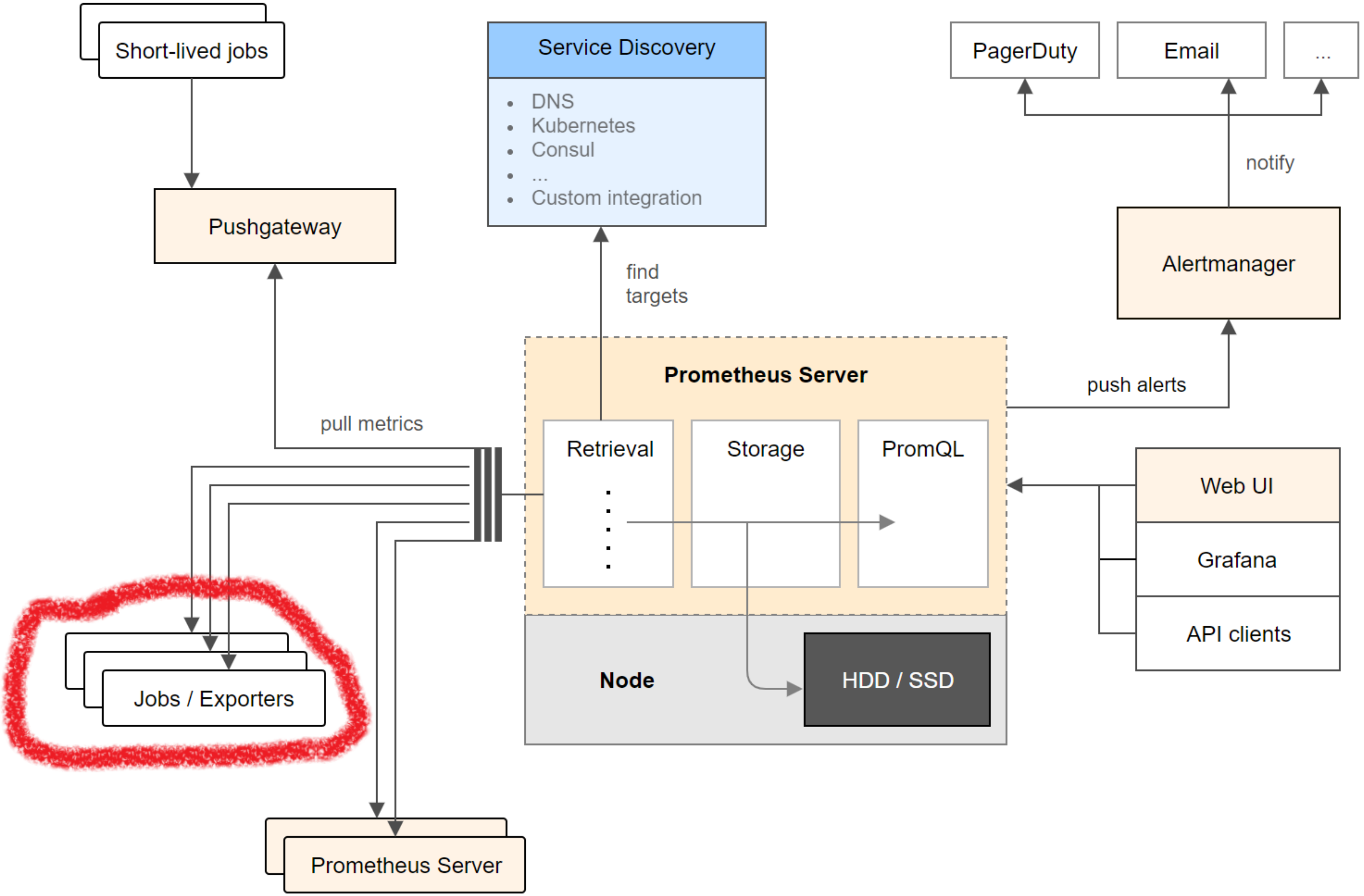

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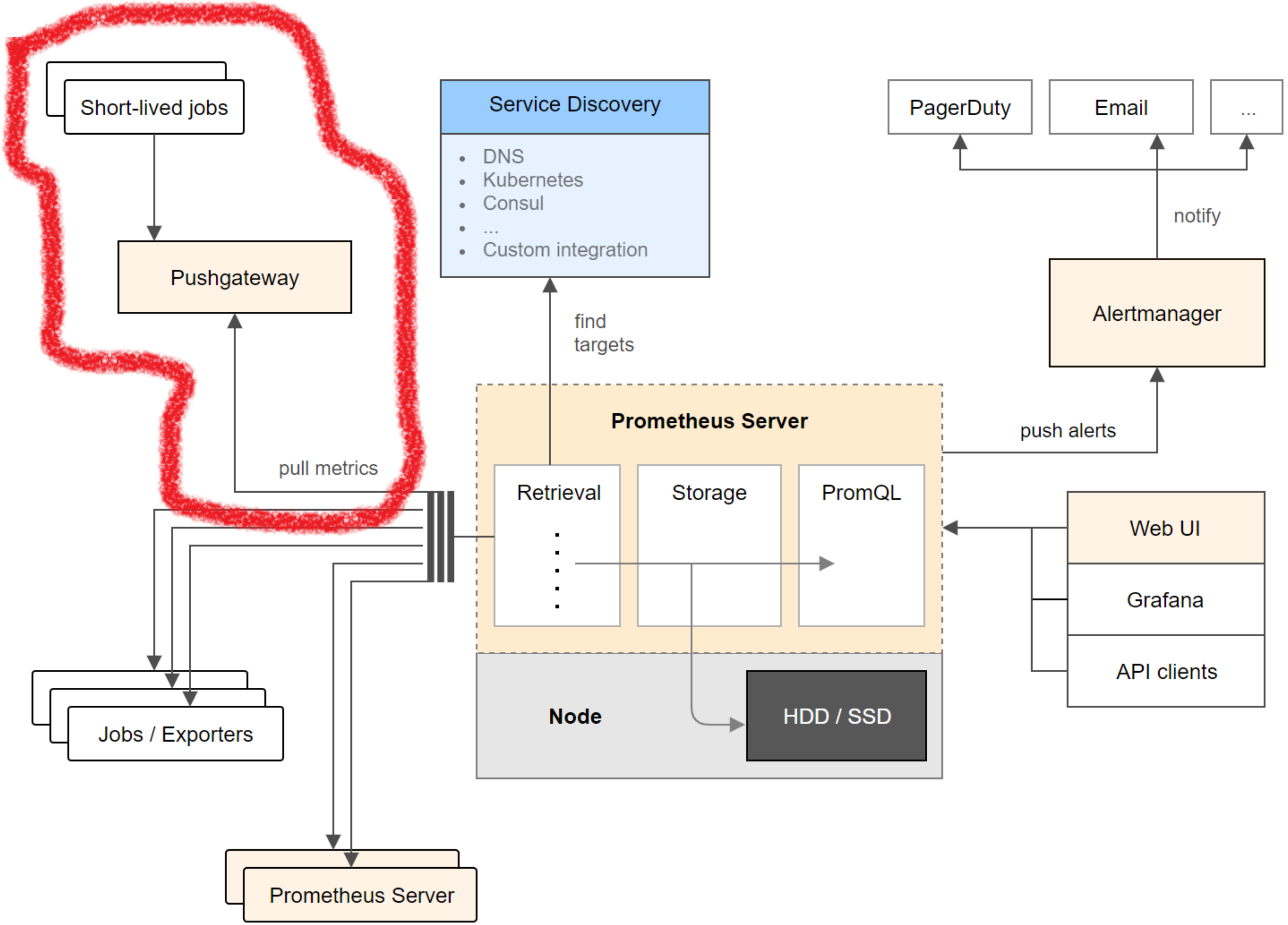

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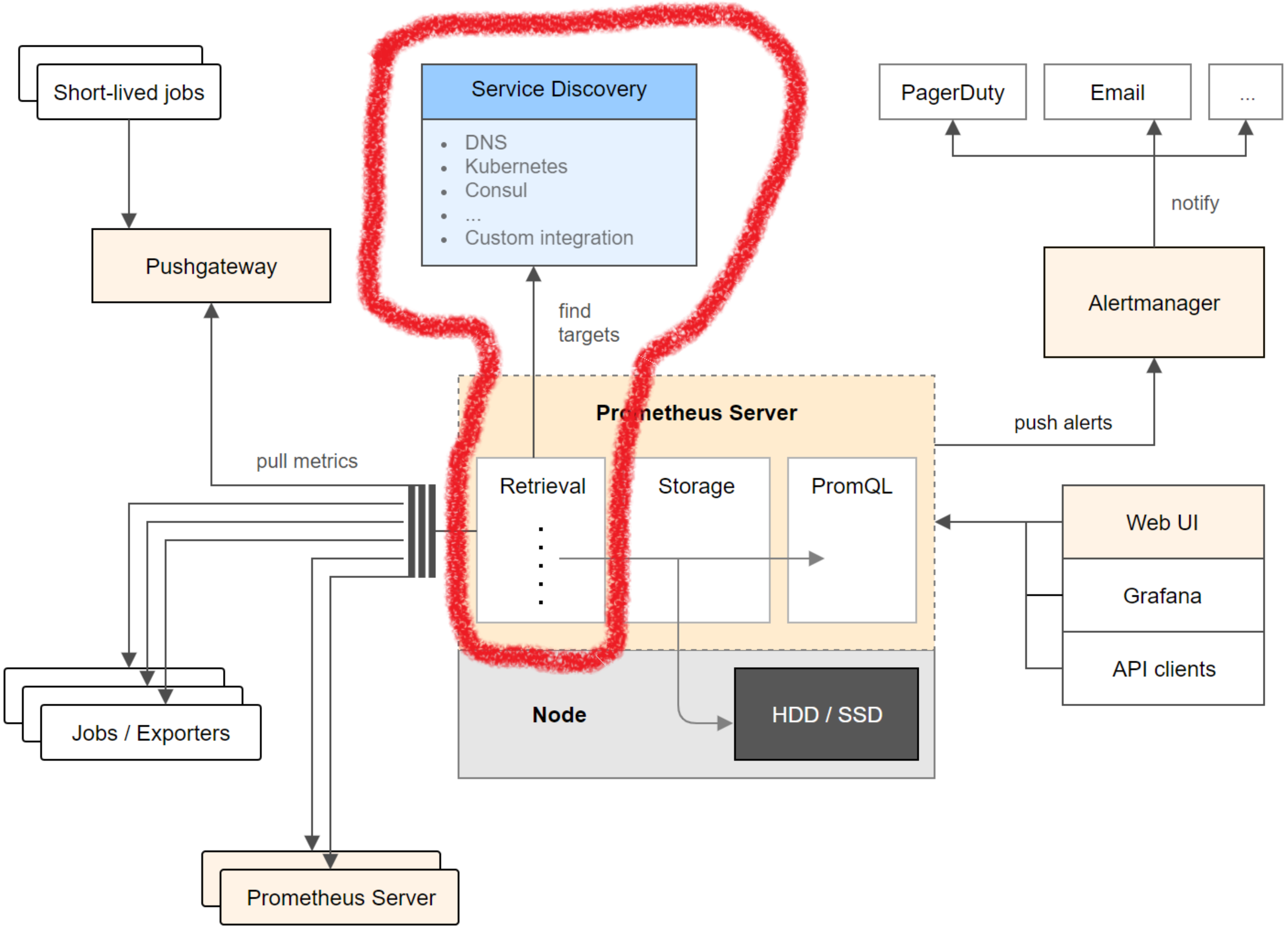
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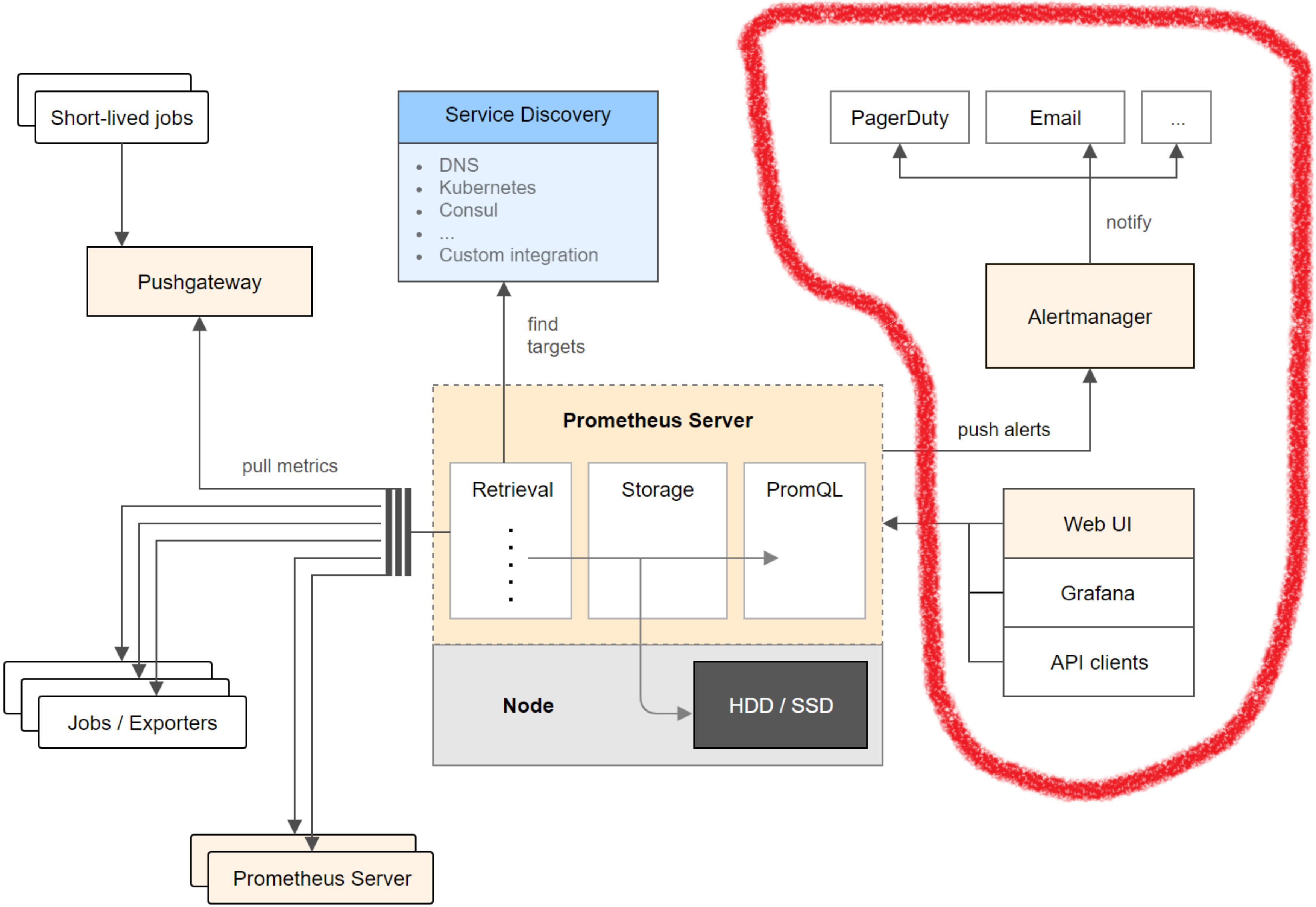
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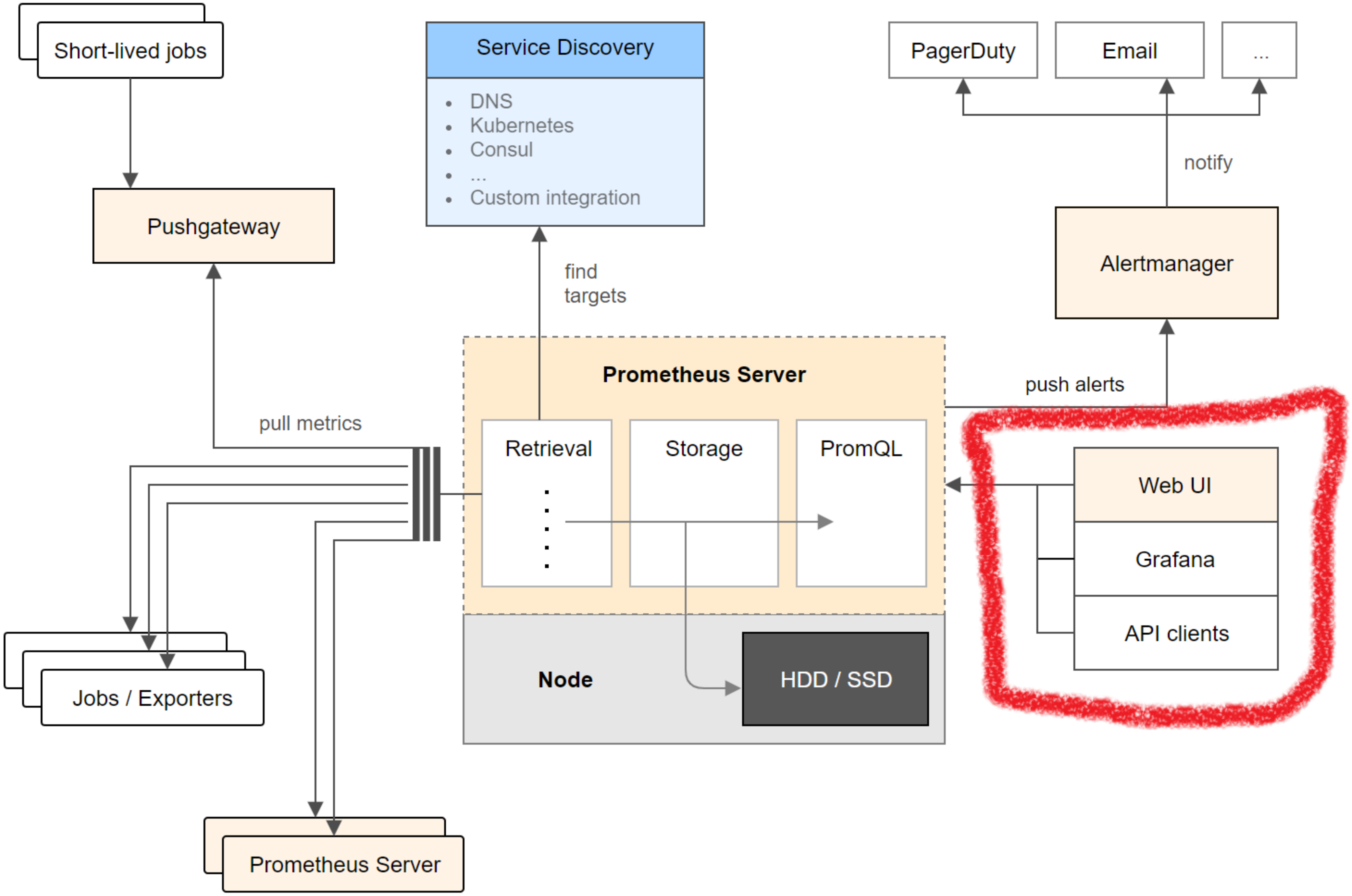
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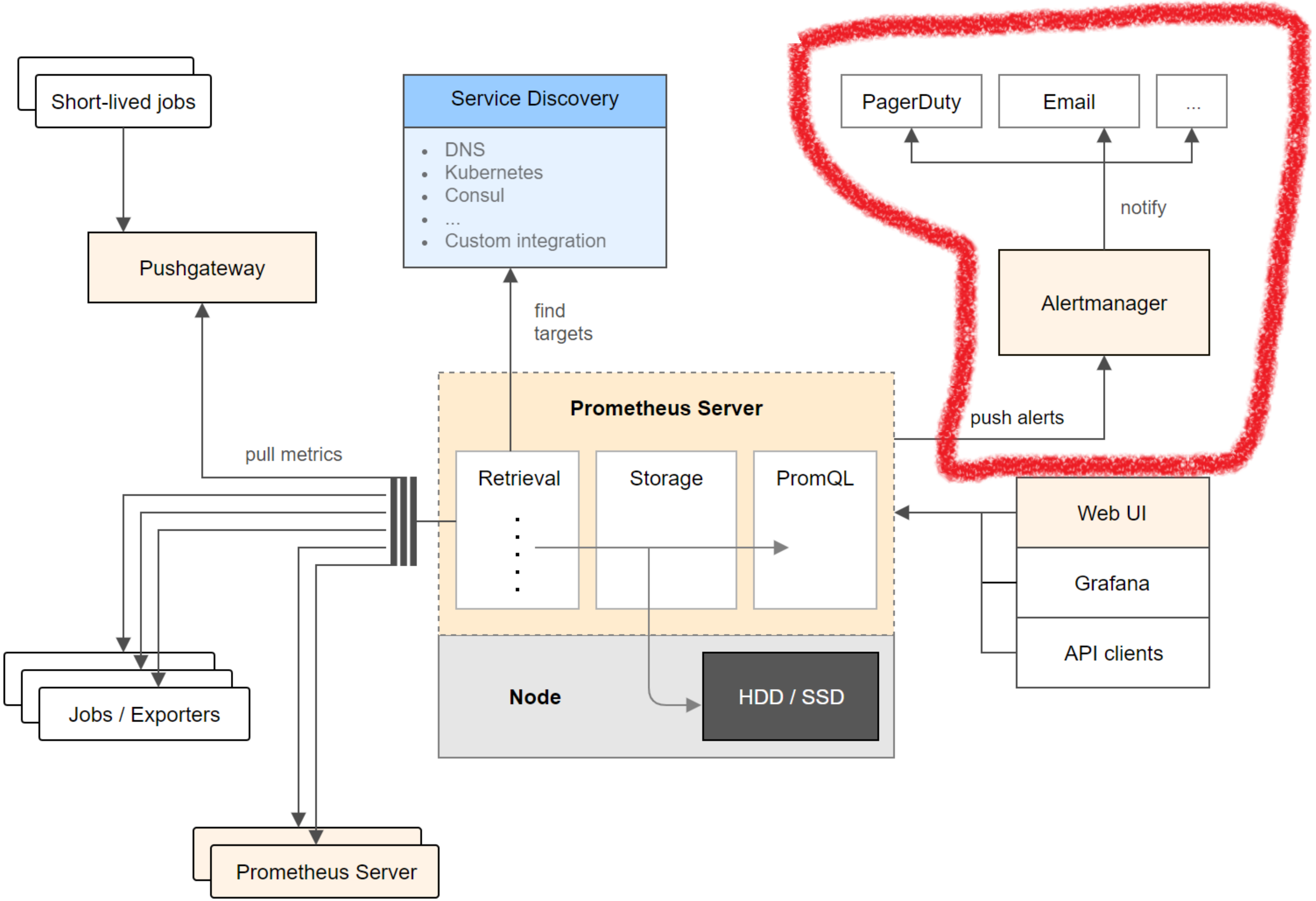
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Metrics

```
my_metric{label_key="Value"} 42,0
```

Metrics

```
my_metric{label_key="Value"} 42,0
```

Metrics

```
my_metric{label_key="Value"} 42,0
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Metrics

```
my_metric{label_key="Value"} 42,0
```

Good Metric Names

Prefix = Application / Namespace

Postfix = Base Unit

Some Base Units

Time	seconds	
Temperature	celsius	
Length	meters	
Bytes & Bits	bytes	
Percent	ratio	Values are 0-1

Some Metric Name Examples

- http_request_duration_seconds
- node_memory_usage_bytes
- http_requests_total
- process_cpu_seconds_total

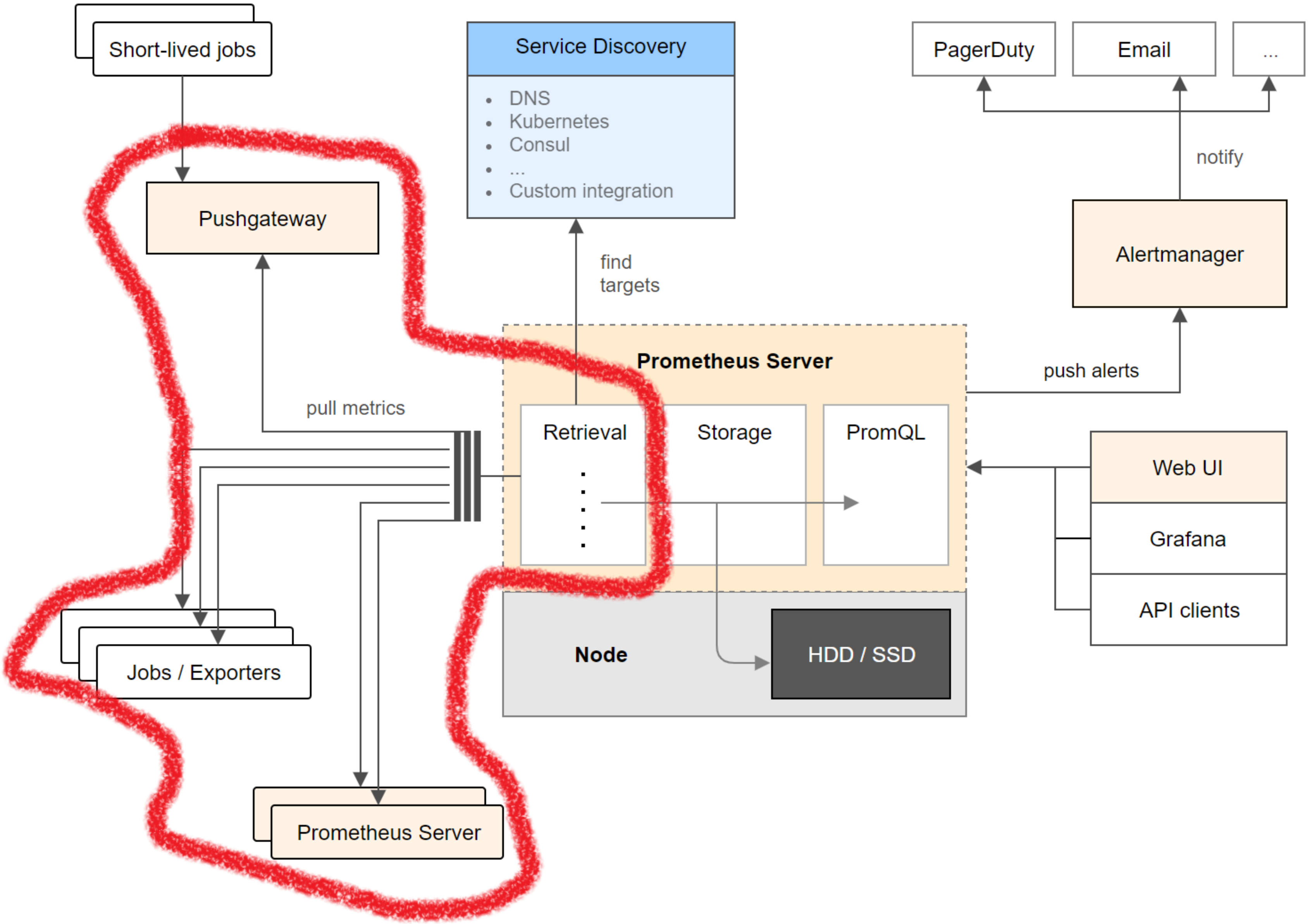
Time Series Database

… is a software system that is optimized for handling time series data indexed by time

Time series

… is uniquely identified by its metric name and a set of key-value pairs, also known as labels.

Scraping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Sample

```
1523596283524 0,24
```

Scrape metrics

```
up{instance="apollo:9047",job="watchtower"} 1

scrape_duration_seconds{instance="apollo:9047",
job="watchtower"} 0.057154051

scrape_samples_scraped{instance="apollo:9047",
job="watchtower"} 108

scrape_samples_post_metric_relabeling{
instance="apollo:9047",job="watchtower"} 108
```

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```
up{instance="apollo:9047",job="watchtower"} 1

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instance="apollo:9047",job="watchtower"} 108
```

Relabeling

```
my_metric{label_key="Value"} 42,0
```

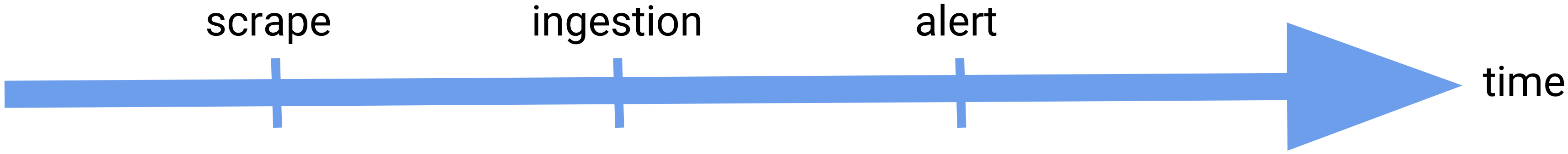
becomes to

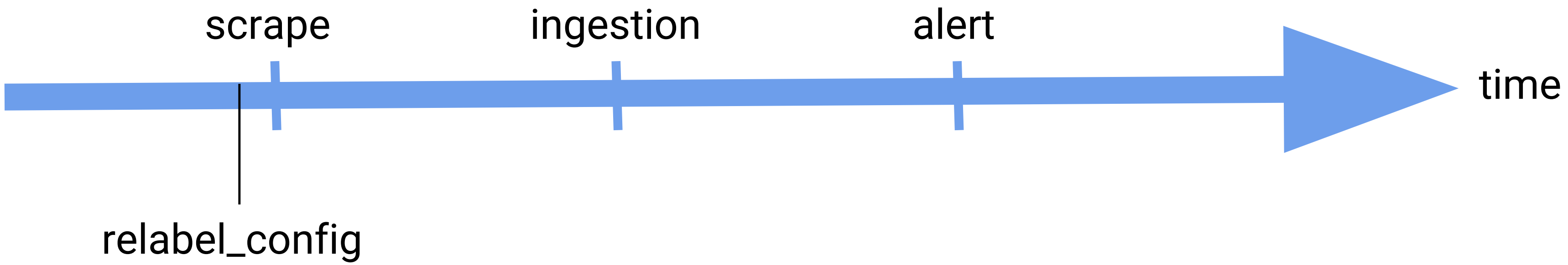
```
my_metric{label_key="Changed Value"} 42,0
```

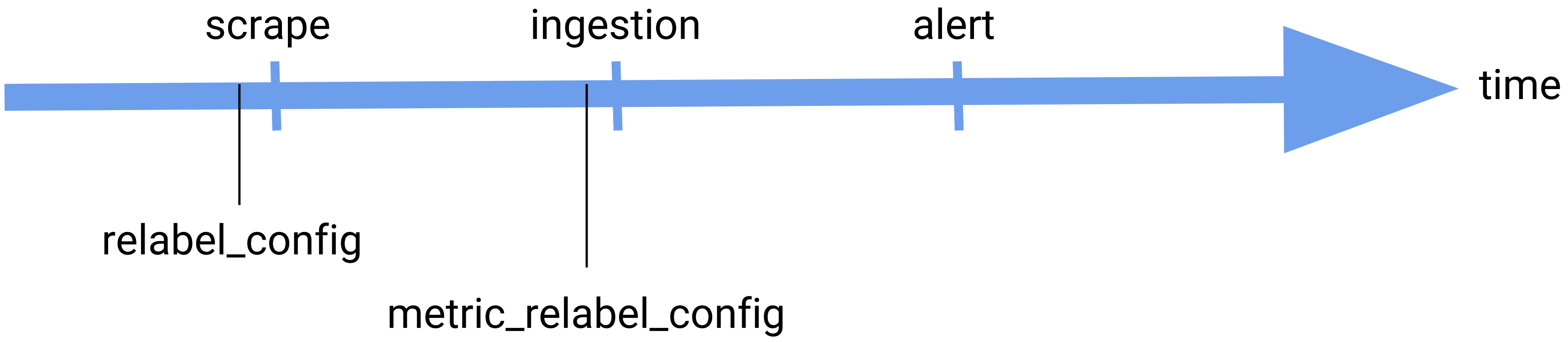
Generated Labels

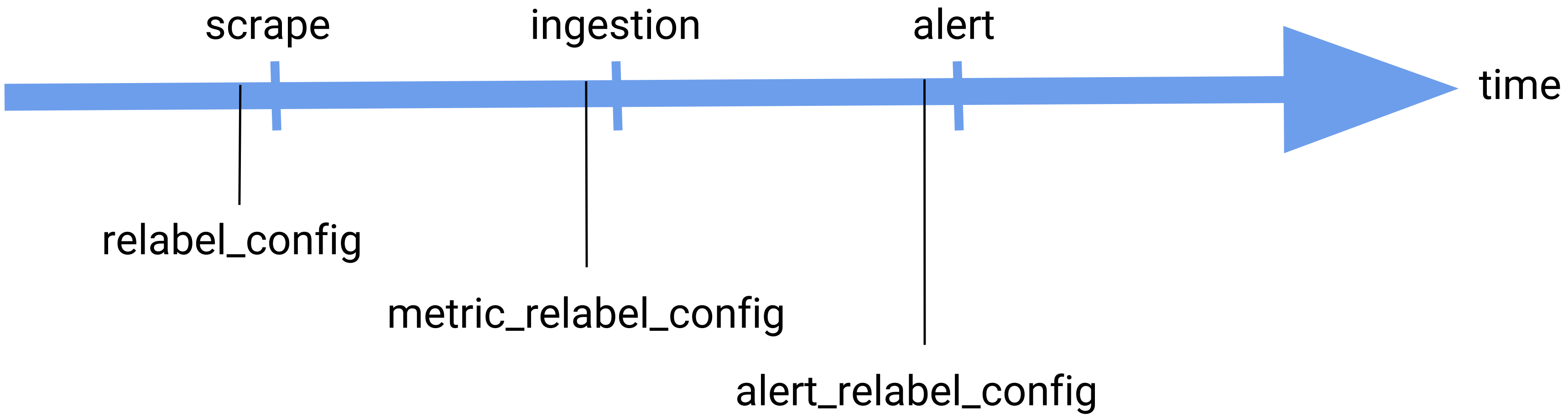
External labels: job, instance

Internal labels: eg __scheme__, __address__, ...


scrape
ingestion
alert
time


scrape
ingestion
alert
time
relabel_config


scrape
ingestion
alert
time
relabel_config
metric_relabel_config


scrape
ingestion
alert
time
relabel_config
metric_relabel_config
alert_relabel_config

Relabeling

```yaml
- job_name: 'node-exporter'
  kubernetes_sd_configs:
    - role: node
  relabel_configs:
    - target_label: __scheme__
      replacement: http
    - source_labels: [__address__]
      regex: ^(.*):\d+$
      target_label: __address__
      replacement: $1:9100
```

Relabeling

```
- job_name: 'node-exporter'
  kubernetes_sd_configs:
    - role: node
  relabel_configs:
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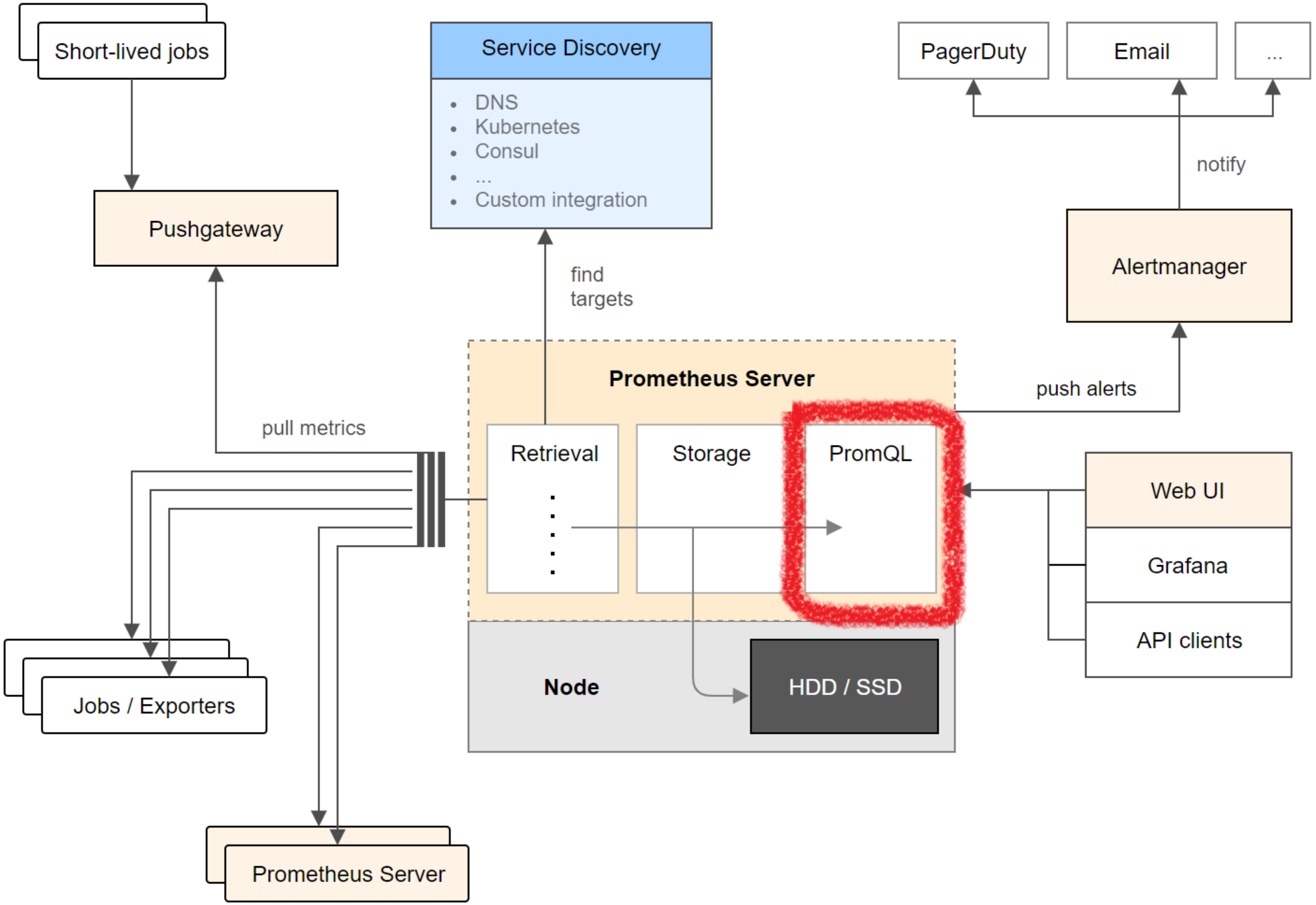
    - source_labels: [__address__]
      regex: ^(.*):\d+$
      target_label: __address__
      replacement: $1:9100
```

Prometheus Query Language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Prometheus Query Language

```
http_requests_total

http_requests_total{method="GET",uri="/hello"}

http_requests_total{instance=~"^.*bb.*$"}

http_requests_total{method="GET|POST"}

http_requests_total offset 5m

sum(http_requests_total)

rate(http_requests_total [5m])
```

Prometheus Query Language

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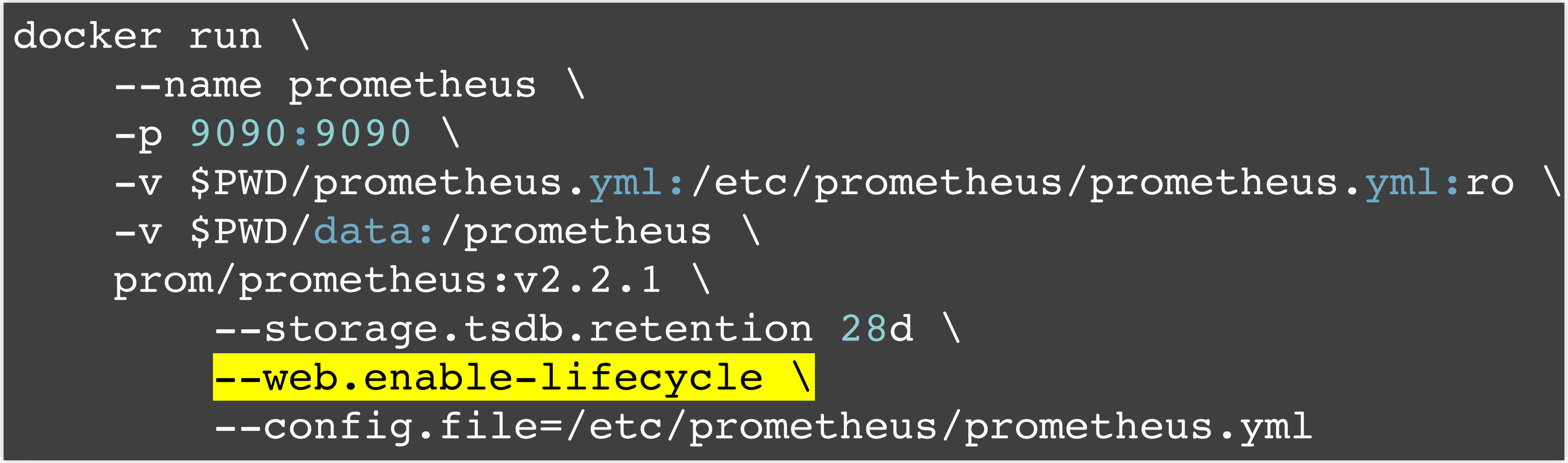
```

Prometheus Reload Mechanisms



```
docker run \
    --name prometheus \
    -p 9090:9090 \
    -v $PWD/prometheus.yml:/etc/prometheus/prometheus.yml:ro \
    -v $PWD/data:/prometheus \
    prom/prometheus:v2.2.1 \
        --storage.tsdb.retention 28d \
        --web.enable-lifecycle \
        --config.file=/etc/prometheus/prometheus.yml
```

Prometheus Reload Mechanisms

Via SIGHUP

```
# within container
kill -SIGHUP 1
```

Via HTTP Post Request

```
curl -XPOST http://localhost:9090/-/reload
```

Prometheus Reload Mechanisms

Via SIGHUP

```
# within container
kill -SIGHUP 1
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Via HTTP Post Request

```
curl -XPOST http://localhost:9090/-/reload
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Prometheus Reload Mechanisms

Via SIGHUP

```
# within container
kill -SIGHUP 1
```

Via HTTP Post Request

```
curl -XPOST http://localhost:9090/-/reload
```

Official Client Libs

Go, Java or Scala, Python, Ruby

Unofficial Client Libs

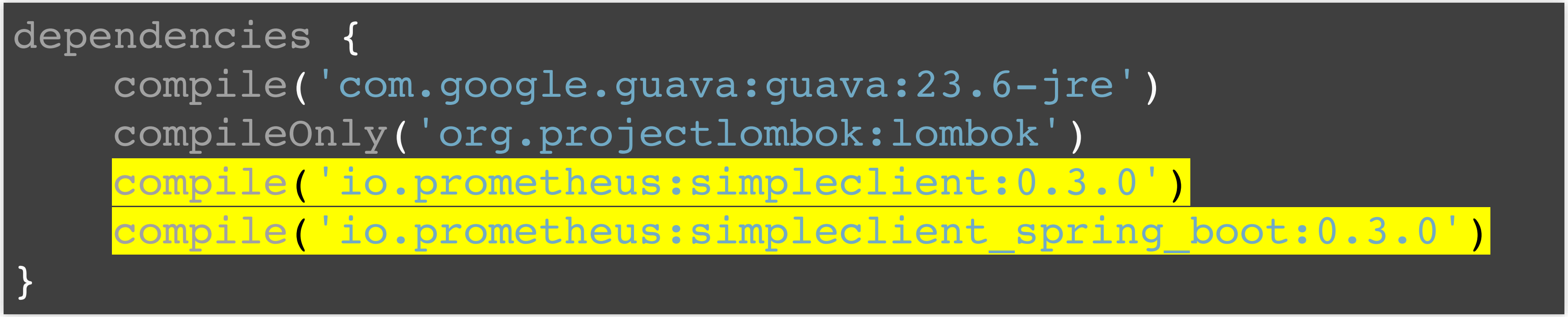
Bash, C++, Lisp, Elixir, Erlang, Haskell, Lua, .NET / C#, Node.js, PHP, Rust

Java & Spring Boot & Prometheus

Prometheus Dependencies

```
dependencies {
    compile('com.google.guava:guava:23.6-jre')
    compileOnly('org.projectlombok:lombok')
    compile('io.prometheus:simpleclient:0.3.0')
    compile('io.prometheus:simpleclient_spring_boot:0.3.0')
}
```

Prometheus Dependencies



```
dependencies {
    compile('com.google.guava:guava:23.6-jre')
    compileOnly('org.projectlombok:lombok')
    compile('io.prometheus:simpleclient:0.3.0')
    compile('io.prometheus:simpleclient_spring_boot:0.3.0')
}
```

Enabling the Prometheus Endpoint

```
@SpringBootApplication
@EnablePrometheusEndpoint
public class MyApplication {

    public static void main(String[] args) {
        SpringApplication.run(MyApplication.class, args);
    }

}
```

Enabling the Prometheus Endpoint

```
@SpringBootApplication
@EnablePrometheusEndpoint
public class MyApplication {

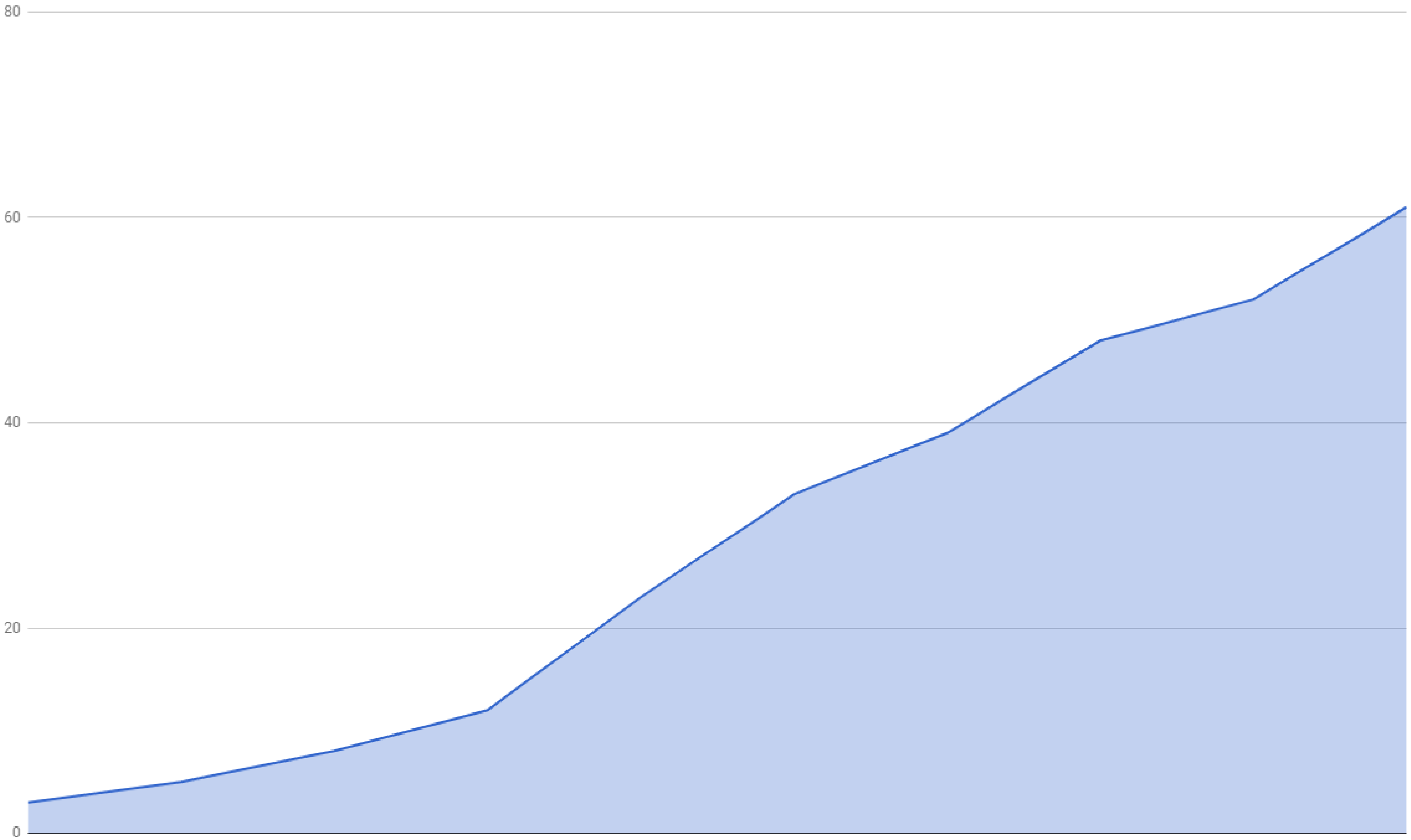
    public static void main(String[] args) {
        SpringApplication.run(MyApplication.class, args);
    }

}
```

Metric Types

Counter
Gauge
Histogram
Summary

Counter



Counter

```java
public class MyClass {

    private static final Counter COUNTER =
        Counter.build().name("my_counter")
            .help("My Counter")
            .labelNames("label_key")
            .register();

    public void myMethod() {
        COUNTER.labels("Value").inc();
    }

}
```

Counter

```
public class MyClass {

    private static final Counter COUNTER =
        Counter.build().name("my_counter")
            .help("My Counter")
            .labelNames("label_key")
            .register();

    public void myMethod() {
        COUNTER.labels("Value").inc();
    }

}
```

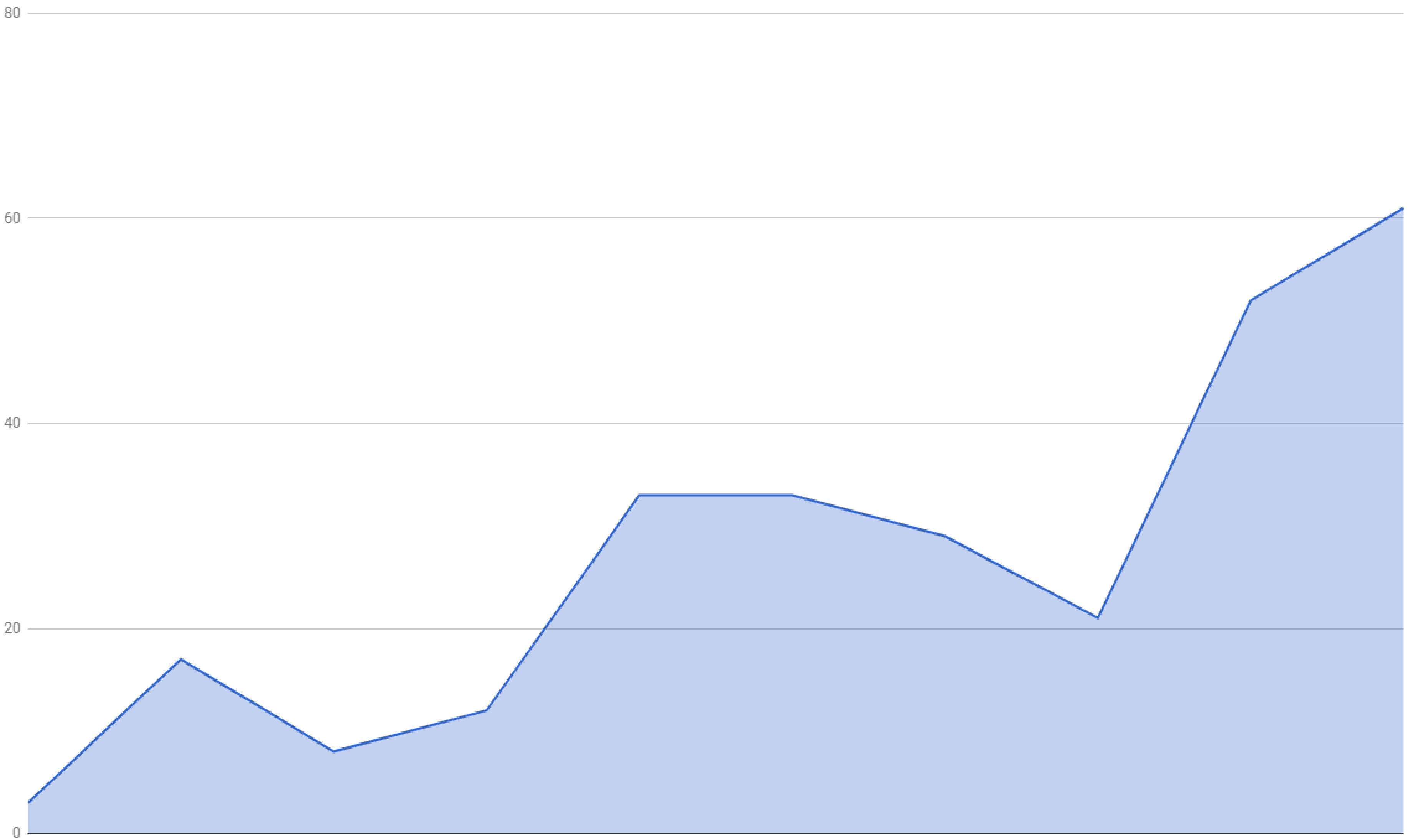
Counter

```
public class MyClass {

    private static final Counter COUNTER =
        Counter.build().name("my_counter")
            .help("My Counter")
            .labelNames("label_key")
            .register();

    public void myMethod() {
        COUNTER.labels("Value").inc();
    }

}
```

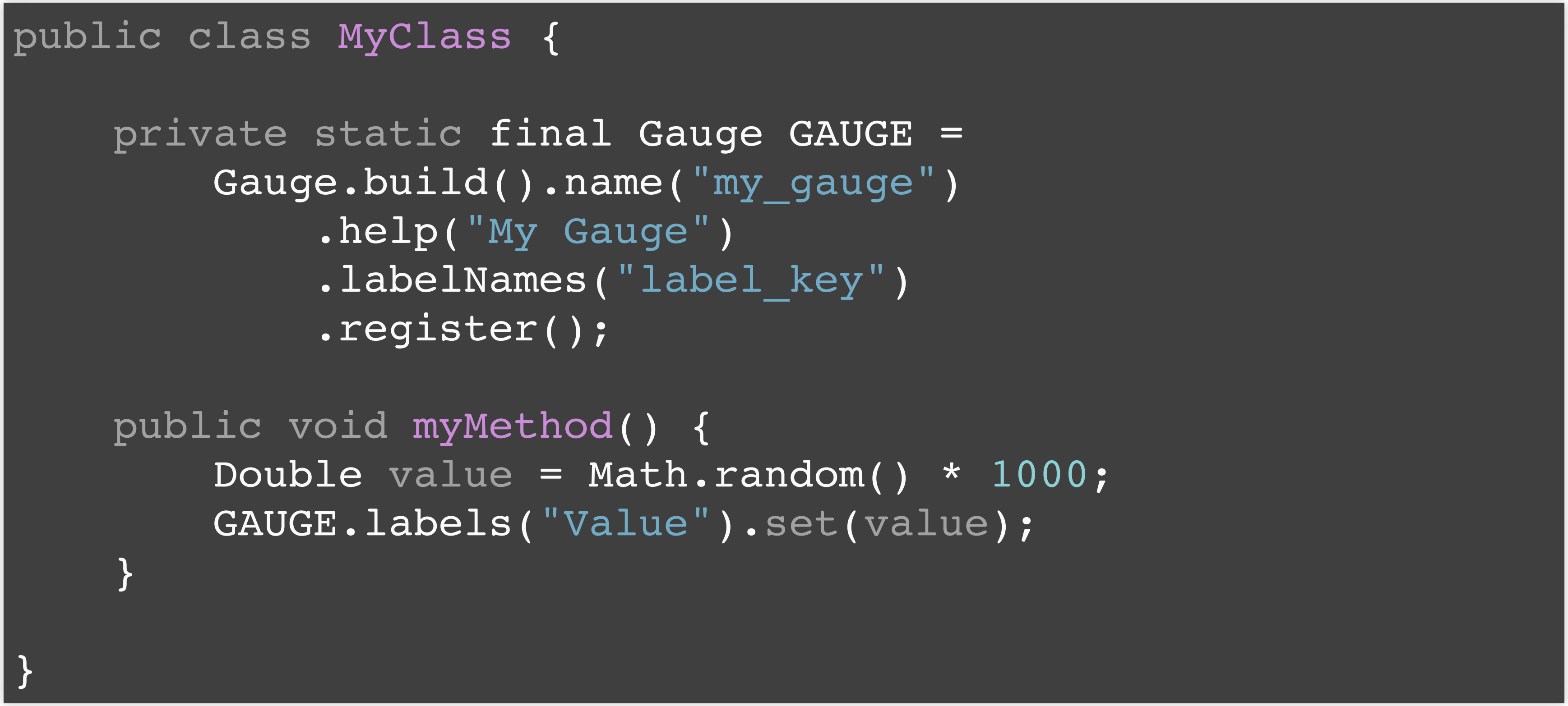
Metrics provided by a Counter

```
# HELP my_counter My Counter
# TYPE my_counter counter
my_counter{label_key="Value",} 57.0
```

Gauge



Gauge



```java
public class MyClass {

    private static final Gauge GAUGE =
        Gauge.build().name("my_gauge")
            .help("My Gauge")
            .labelNames("label_key")
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        GAUGE.labels("Value").set(value);
    }

}
```

Gauge

```
public class MyClass {

    private static final Gauge GAUGE =
        Gauge.build().name("my_gauge")
            .help("My Gauge")
            .labelNames("label_key")
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        GAUGE.labels("Value").set(value);
    }

}
```

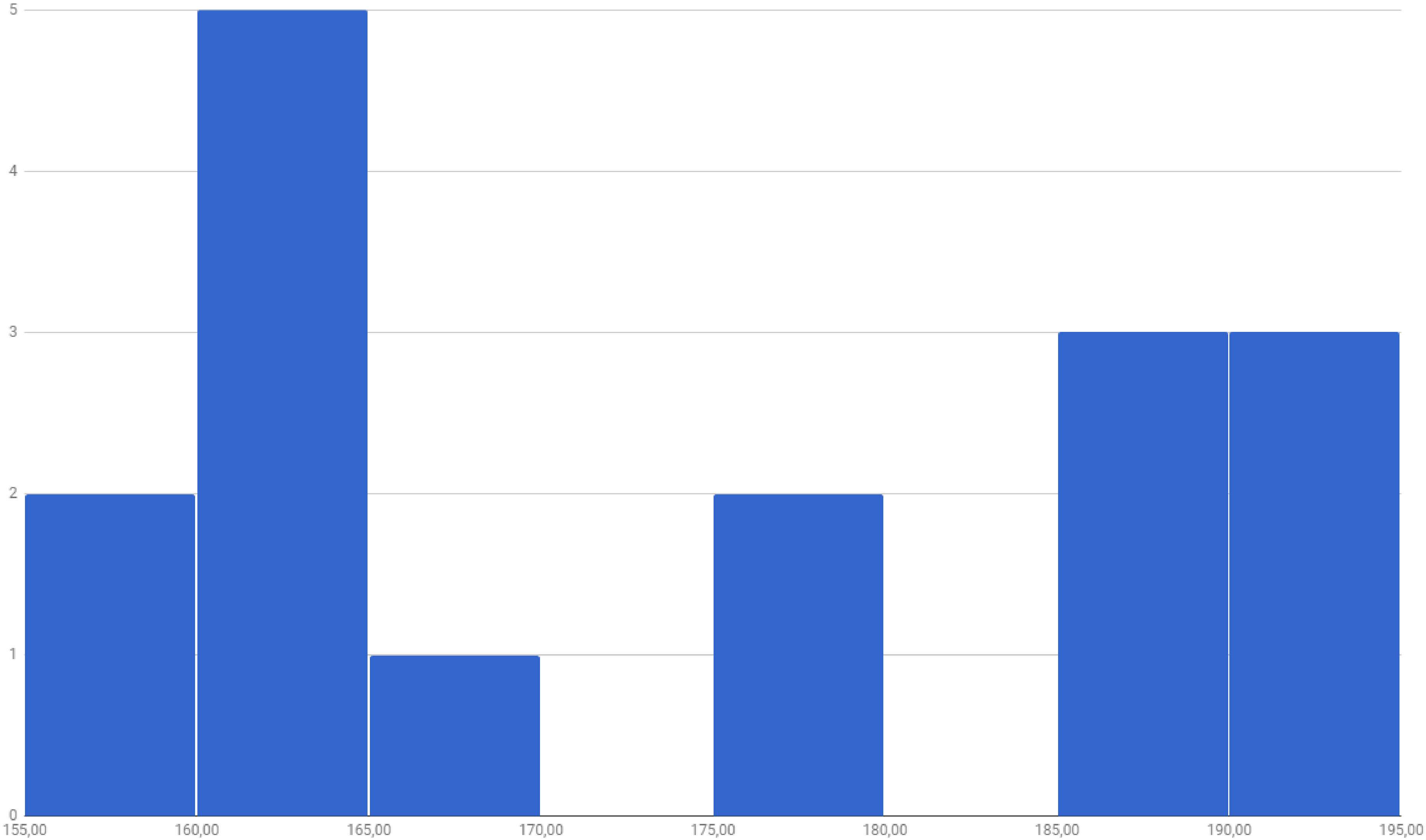
Gauge

```
public class MyClass {

    private static final Gauge GAUGE =
        Gauge.build().name("my_gauge")
            .help("My Gauge")
            .labelNames("label_key")
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        GAUGE.labels("Value").set(value);
    }

}
```

Metrics provided by a Gauge

```
# HELP my_gauge My Gauge
# TYPE my_gauge gauge
my_gauge{label_key="Value",} 436.96778465124686
```

Histogram

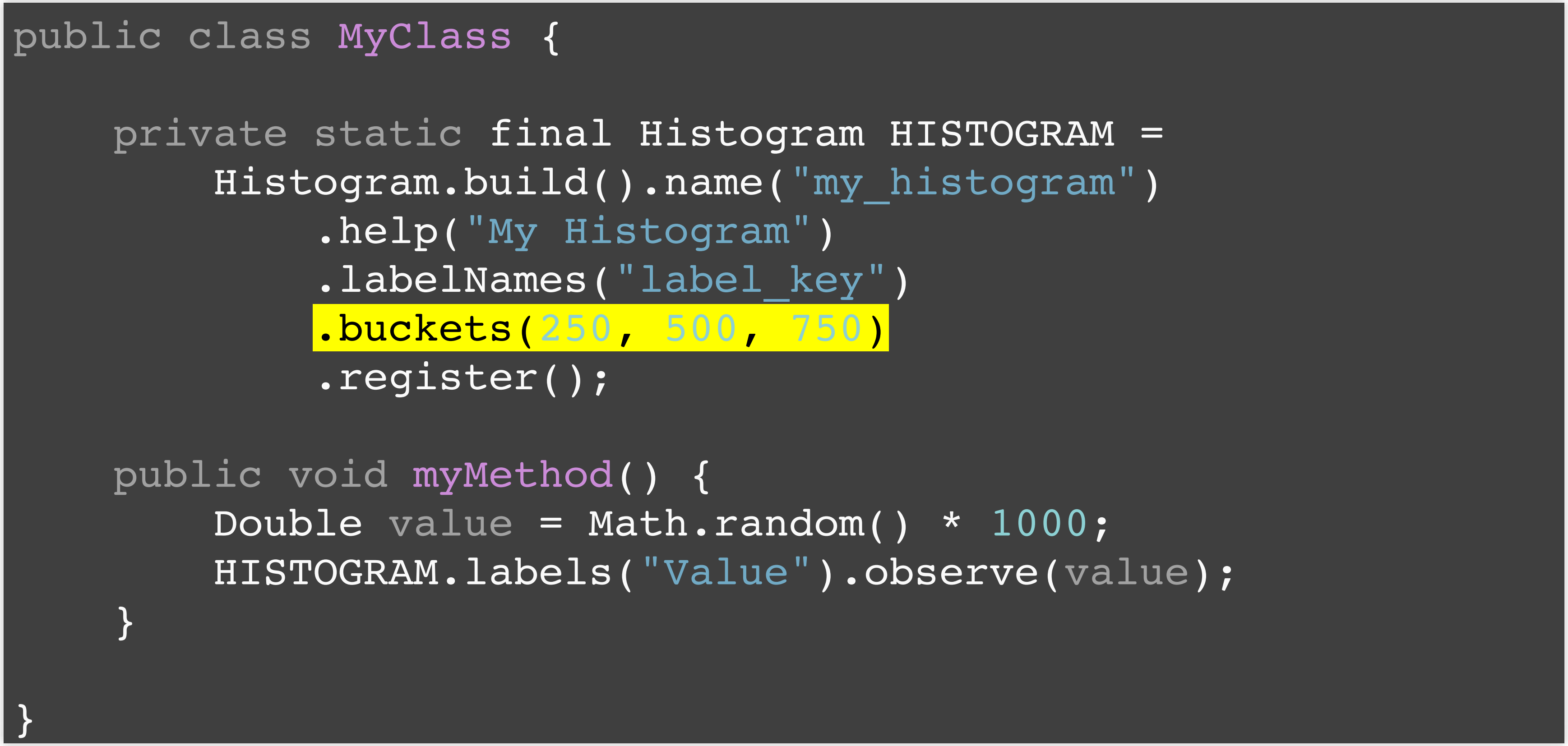


5
4
3
2
1
0
155,00
160,00
165,00
170,00
175,00
180,00
185,00
190,00
195,00

Histogram

```
public class MyClass {

    private static final Histogram HISTOGRAM =
        Histogram.build().name("my_histogram")
            .help("My Histogram")
            .labelNames("label_key")
            .buckets(250, 500, 750)
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        HISTOGRAM.labels("Value").observe(value);
    }

}
```

Histogram



```java
public class MyClass {

    private static final Histogram HISTOGRAM =
        Histogram.build().name("my_histogram")
            .help("My Histogram")
            .labelNames("label_key")
            .buckets(250, 500, 750)
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        HISTOGRAM.labels("Value").observe(value);
    }

}
```

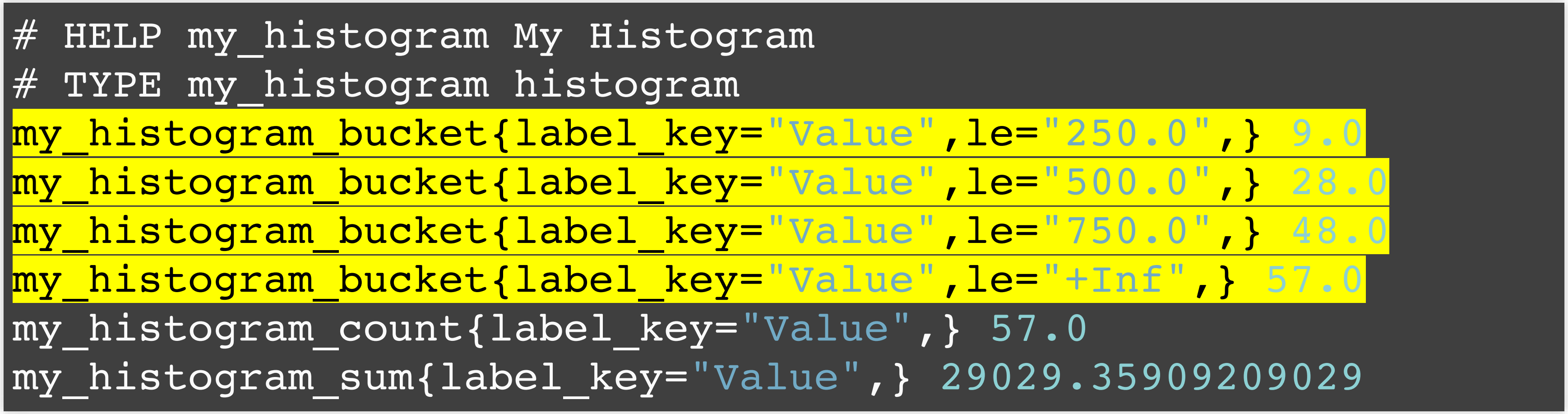
Histogram

```
public class MyClass {

    private static final Histogram HISTOGRAM =
        Histogram.build().name("my_histogram")
            .help("My Histogram")
            .labelNames("label_key")
            .buckets(250, 500, 750)
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        HISTOGRAM.labels("Value").observe(value);
    }

}
```

Metrics provided by a Histogram

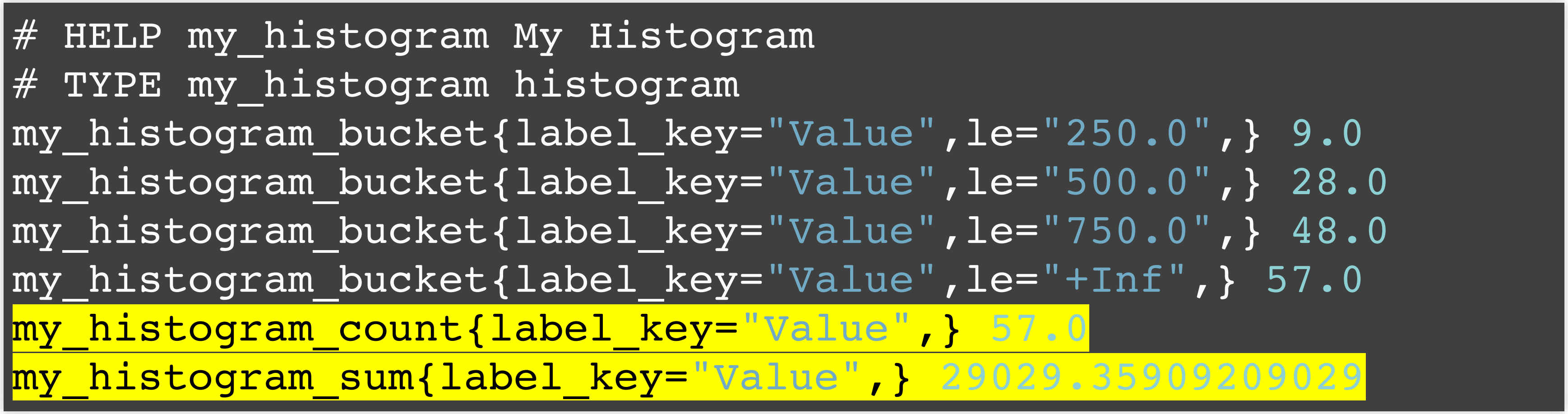
```
# HELP my_histogram My Histogram
# TYPE my_histogram histogram
my_histogram_bucket{label_key="Value",le="250.0",} 9.0
my_histogram_bucket{label_key="Value",le="500.0",} 28.0
my_histogram_bucket{label_key="Value",le="750.0",} 48.0
my_histogram_bucket{label_key="Value",le="+Inf",} 57.0
my_histogram_count{label_key="Value",} 57.0
my_histogram_sum{label_key="Value",} 29029.35909209029
```

Metrics provided by a Histogram



```
# HELP my_histogram My Histogram
# TYPE my_histogram histogram
my_histogram_bucket{label_key="Value",le="250.0",} 9.0
my_histogram_bucket{label_key="Value",le="500.0",} 28.0
my_histogram_bucket{label_key="Value",le="750.0",} 48.0
my_histogram_bucket{label_key="Value",le="+Inf",} 57.0
my_histogram_count{label_key="Value",} 57.0
my_histogram_sum{label_key="Value",} 29029.35909209029
```

Metrics provided by a Histogram



```
# HELP my_histogram My Histogram
# TYPE my_histogram histogram
my_histogram_bucket{label_key="Value",le="250.0",} 9.0
my_histogram_bucket{label_key="Value",le="500.0",} 28.0
my_histogram_bucket{label_key="Value",le="750.0",} 48.0
my_histogram_bucket{label_key="Value",le="+Inf",} 57.0
my_histogram_count{label_key="Value",} 57.0
my_histogram_sum{label_key="Value",} 29029.35909209029
```

Quantiles Calculation

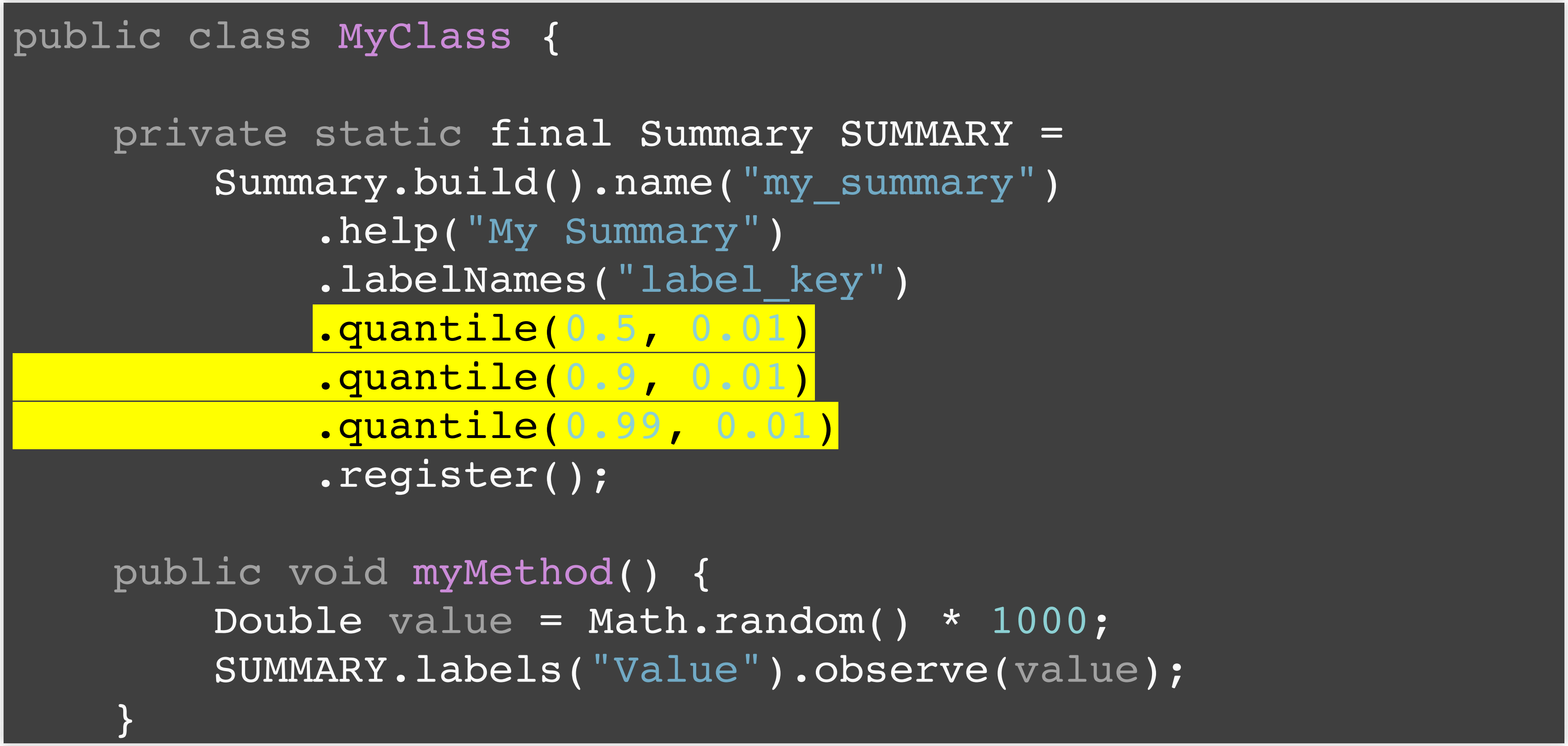
```
histogram_quantile(0.9, rate(my_histogram_bucket[10m]))
```

Summary

Summary

```java
public class MyClass {

    private static final Summary SUMMARY =
        Summary.build().name("my_summary")
            .help("My Summary")
            .labelNames("label_key")
            .quantile(0.5, 0.01)
            .quantile(0.9, 0.01)
            .quantile(0.99, 0.01)
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        SUMMARY.labels("Value").observe(value);
    }
```

Summary



```
public class MyClass {

    private static final Summary SUMMARY =
        Summary.build().name("my_summary")
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            .labelNames("label_key")
            .quantile(0.5, 0.01)
            .quantile(0.9, 0.01)
            .quantile(0.99, 0.01)
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        SUMMARY.labels("Value").observe(value);
    }
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public class MyClass {

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            .help("My Summary")
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            .quantile(0.5, 0.01)
            .quantile(0.9, 0.01)
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            .labelNames("label_key")
            .quantile(0.5, 0.01)
            .quantile(0.9, 0.01)
            .quantile(0.99, 0.01)
            .register();

    public void myMethod() {
        Double value = Math.random() * 1000;
        SUMMARY.labels("Value").observe(value);
    }
```

Metrics provided by a Summary

```
# HELP my_summary My Summary
# TYPE my_summary summary
my_summary{label_key="Value",quantile="0.5",} 475.3
my_summary{label_key="Value",quantile="0.9",} 878.6
my_summary{label_key="Value",quantile="0.99",} 968.7
my_summary_count{label_key="Value",} 57.0
my_summary_sum{label_key="Value",} 29029.3
```

Metrics provided by a Summary

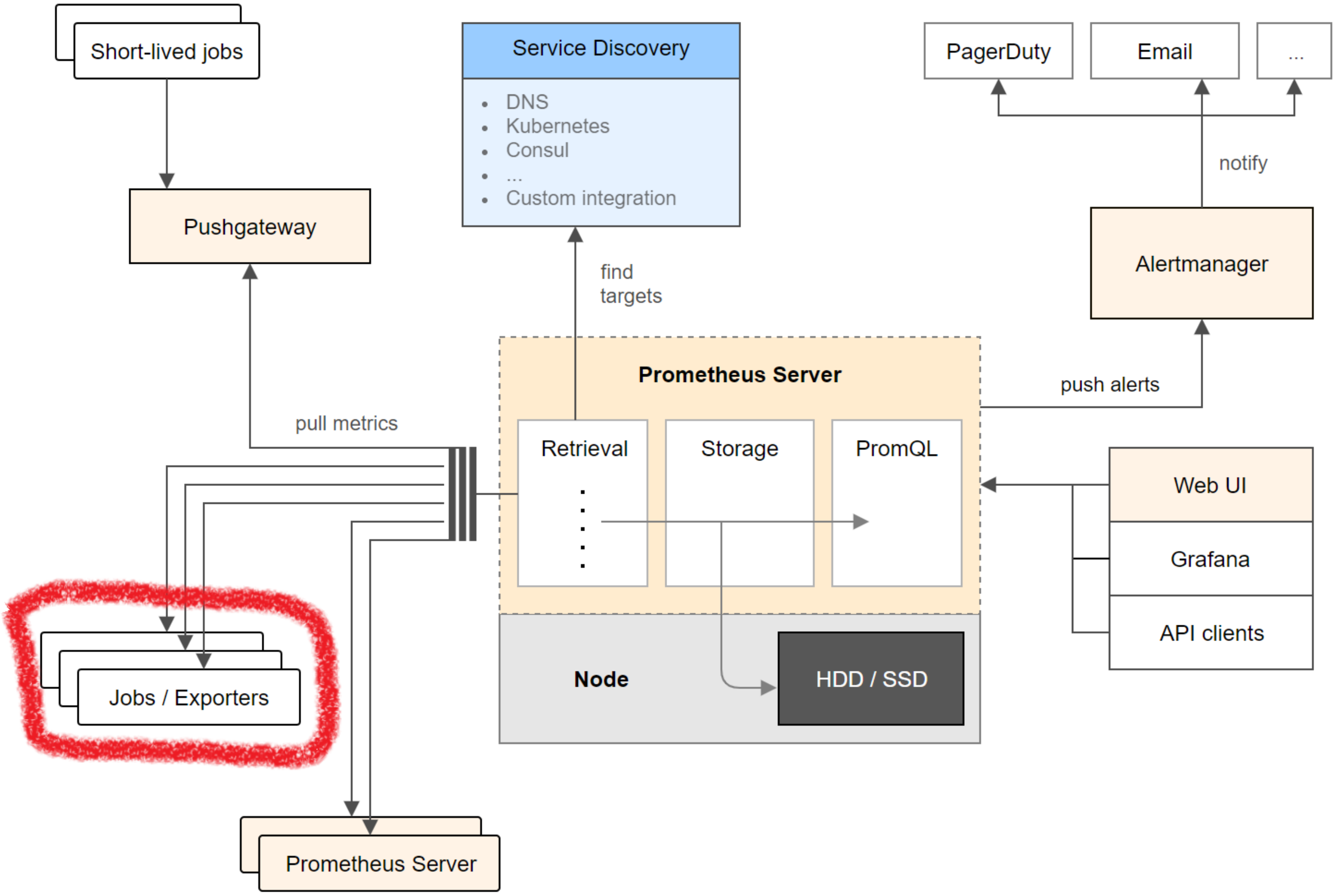
```
# HELP my_summary My Summary
# TYPE my_summary summary
my_summary{label_key="Value",quantile="0.5",} 475.3
my_summary{label_key="Value",quantile="0.9",} 878.6
my_summary{label_key="Value",quantile="0.99",} 968.7
my_summary_count{label_key="Value",} 57.0
my_summary_sum{label_key="Value",} 29029.3
```

Metrics provided by a Summary

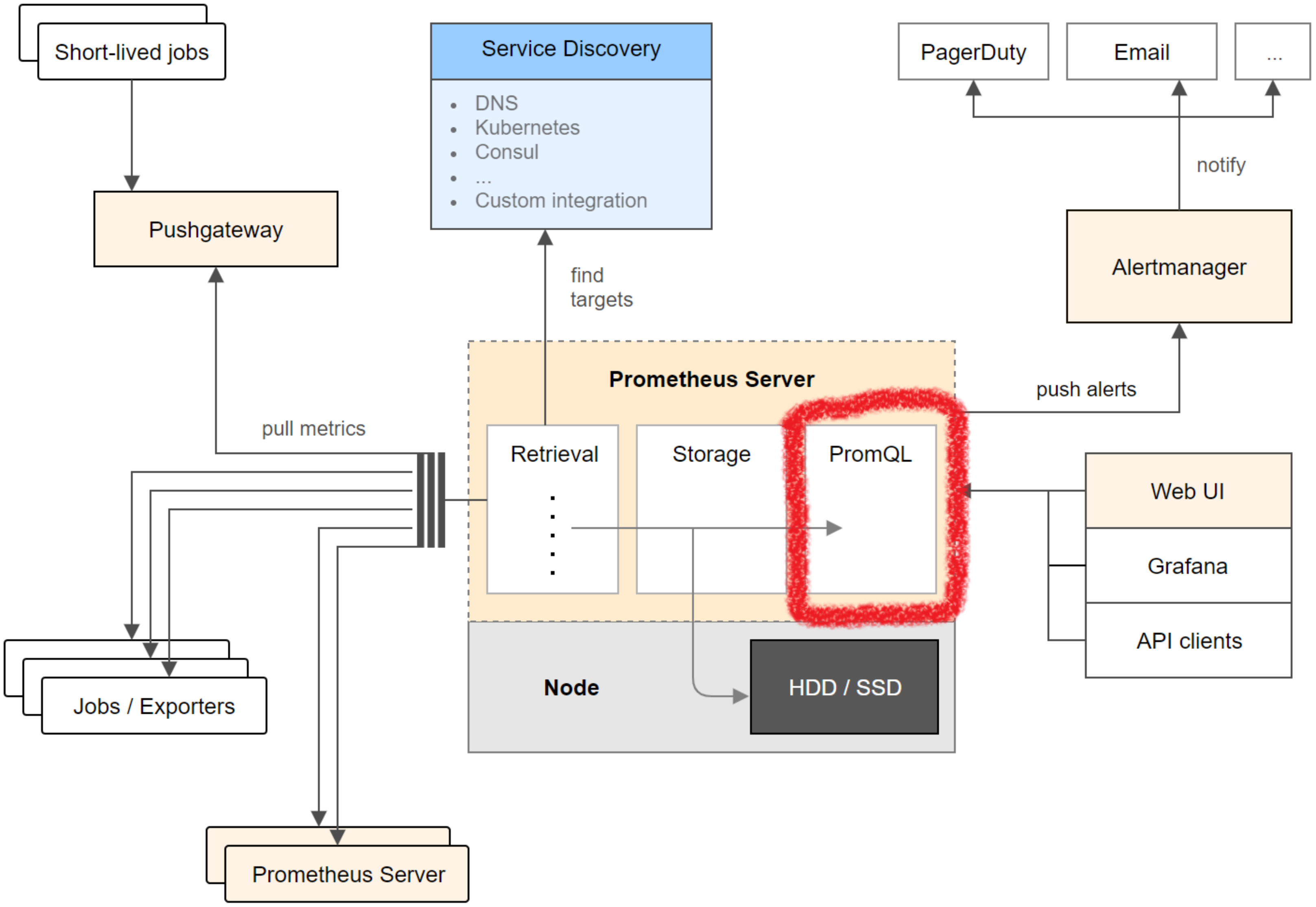
```
# HELP my_summary My Summary
# TYPE my_summary summary
my_summary{label_key="Value",quantile="0.5",} 475.3
my_summary{label_key="Value",quantile="0.9",} 878.6
my_summary{label_key="Value",quantile="0.99",} 968.7
my_summary_count{label_key="Value",} 57.0
my_summary_sum{label_key="Value",} 29029.3
```

Summary vs Histogram

Summary


Short-lived jobs
Service Discovery
DNS
Kubernetes
Consul
...
Custom integration
PagerDuty
Email
...
notify
Pushgateway
find targets
Alertmanager
Prometheus Server
push alerts
pull metrics
Retrieval
Storage
PromQL
Web UI
Grafana
API clients
Node
HDD / SSD
Jobs / Exporters
Prometheus Server

Histogram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find targets
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Prometheus Server
push alerts
pull metrics
Retrieval
Storage
PromQL
Web UI
Grafana
API clients
Jobs / Exporters
Node
HDD / SSD
Prometheus Server

Timing a method

```
@SpringBootApplication
@EnablePrometheusEndpoint
@EnablePrometheusTiming
public class MyApplication {

    public static void main(String[] args) {
        SpringApplication.run(MyApplication.class, args);
    }

}
```

Timing a method

```
@SpringBootApplication
@EnablePrometheusEndpoint
@EnablePrometheusTiming
public class MyApplication {

    public static void main(String[] args) {
        SpringApplication.run(MyApplication.class, args);
    }

}
```

Timing a method

```
@Component
public class MyComponent {

    @PrometheusTimeMethod(name="method_duration_in_seconds",
                          help="Method duration in seconds")
    public void myMethod() {
        // do stuff
    }

}
```

Timing a method

```
@Component
public class MyComponent {

    @PrometheusTimeMethod(name = "method_duration_in_seconds",
                          help = "Method duration in seconds")
    public void myMethod() {
        // do stuff
    }

}
```

Metrics of a timed method

```
# Summary of the method timings
method_duration_in_seconds_count 21.0
method_duration_in_seconds_sum 1.017764557
```

Adding Spring Boot Metrics

```
@SpringBootApplication
@EnablePrometheusEndpoint
@EnablePrometheusTiming
@EnableSpringBootMetricsCollector
public class MyApplication {

    public static void main(String[] args) {
        SpringApplication.run(MyApplication.class, args);
    }

}
```

Adding Spring Boot Metrics

```
@SpringBootApplication
@EnablePrometheusEndpoint
@EnablePrometheusTiming
@EnableSpringBootMetricsCollector
public class MyApplication {

    public static void main(String[] args) {
        SpringApplication.run(MyApplication.class, args);
    }

}
```

Some useful Spring Boot Metrics

```
# free memory in bytes
mem_free 397547.0

# uptime in seconds
uptime 17192.0

# number of threads
threads 21.0

# sum of response times in milliseconds of endpoint /hello
gauge_response_hello 74.0

# number of responses with status code 200 of endpoint /hello
counter_status_200_hello 2.0
```

Some useful Spring Boot Metrics

```
# free memory in bytes
mem_free 397547.0

# uptime in seconds
uptime 17192.0

# number of threads
threads 21.0

# sum of response times in milliseconds of endpoint /hello
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# number of threads
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# number of threads
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# number of threads
threads 21.0

# sum of response times in milliseconds of endpoint /hello
gauge_response_hello 74.0

# number of responses with status code 200 of endpoint /hello
counter_status_200_hello 2.0
```

Micrometer

Micrometer

by Pivotal

think SLF4J, but for metrics

Micrometer

Prometheus, Netflix Atlas, CloudWatch, Datadog, Graphite, Ganglia, JMX, Influx/Telegraf, New Relic, StatsD, SignalFx, Wavefront

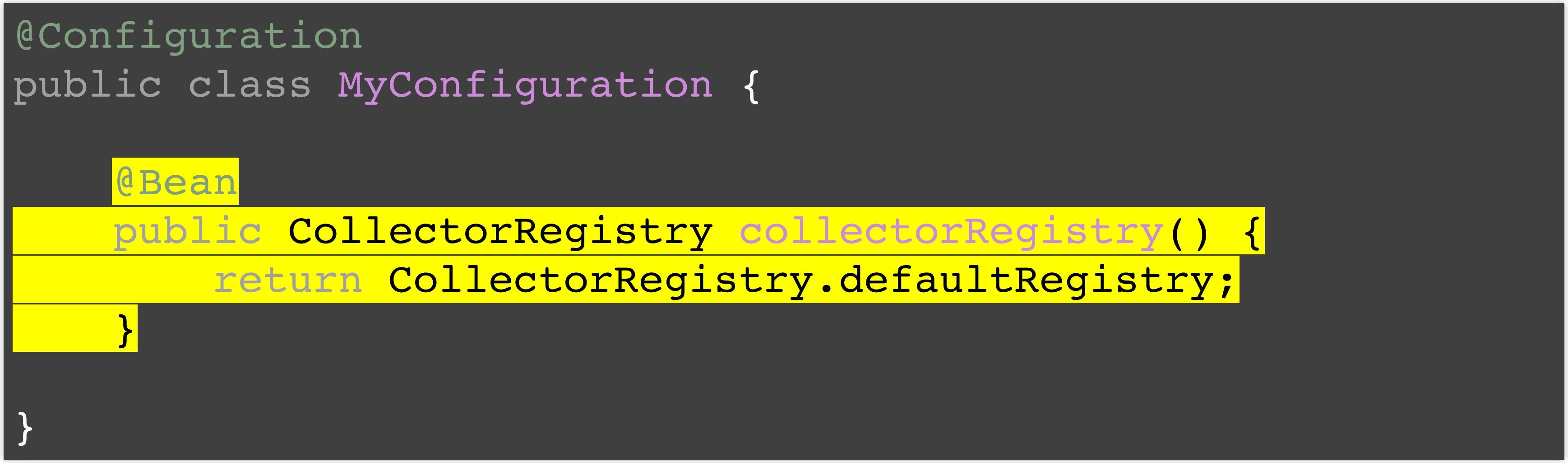
Using Prometheus libs with Micrometer

```
@Configuration
public class MyConfiguration {

    @Bean
    public CollectorRegistry collectorRegistry() {
        return CollectorRegistry.defaultRegistry;
    }

}
```

Using Prometheus libs with Micrometer

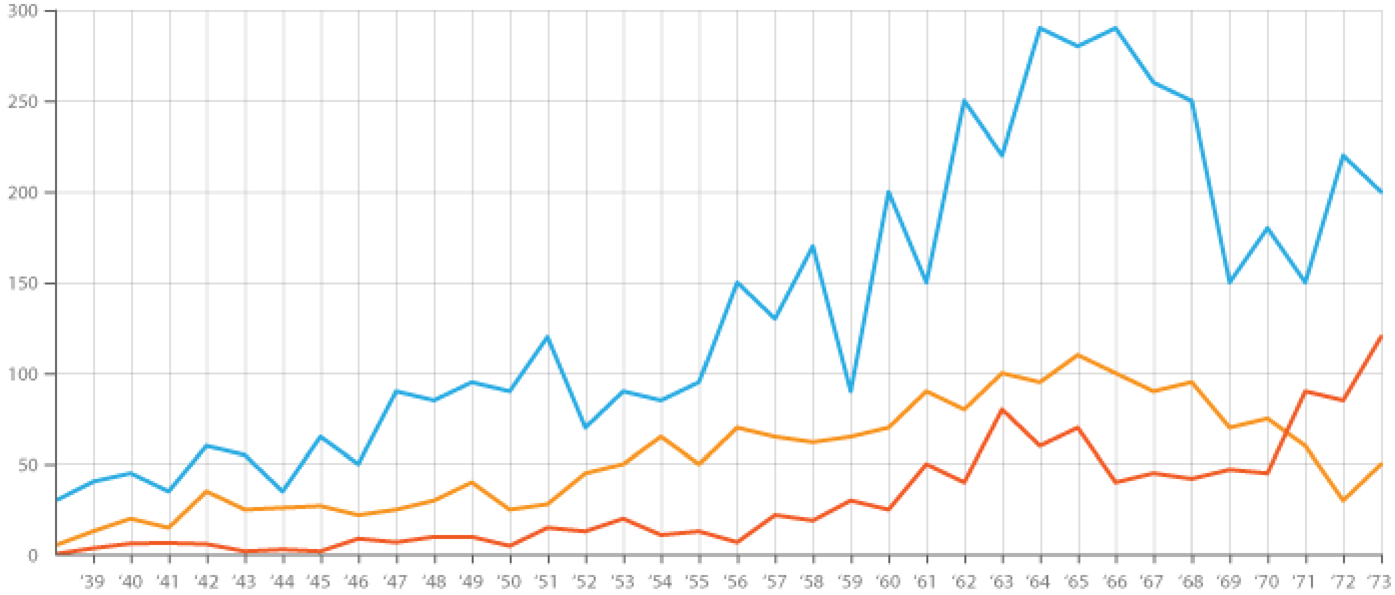


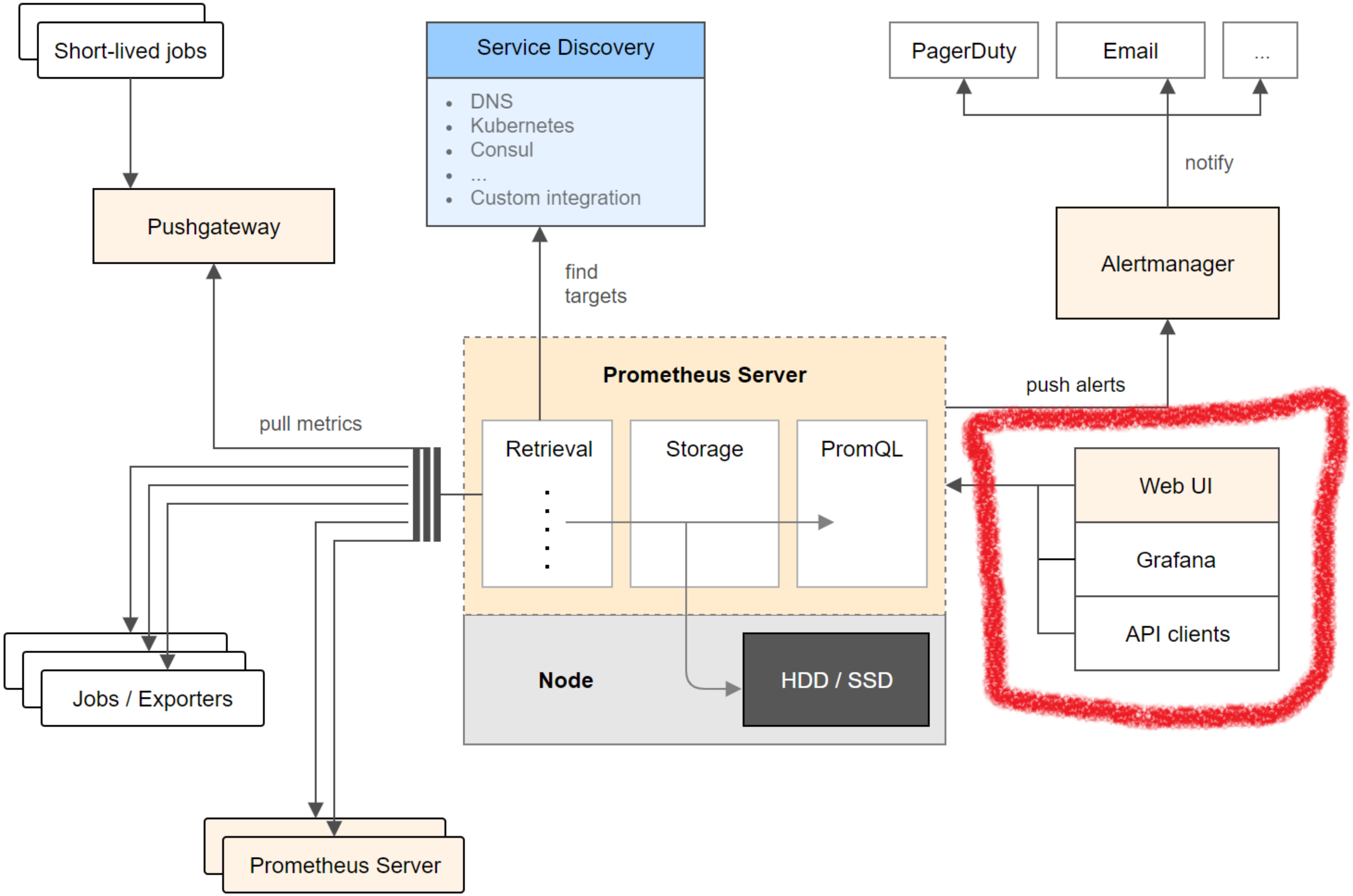
```
@Configuration
public class MyConfiguration {

    @Bean
    public CollectorRegistry collectorRegistry() {
        return CollectorRegistry.defaultRegistry;
    }

}
```

Visualization




Short-lived jobs
Service Discovery
DNS
Kubernetes
Consul
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Custom integration
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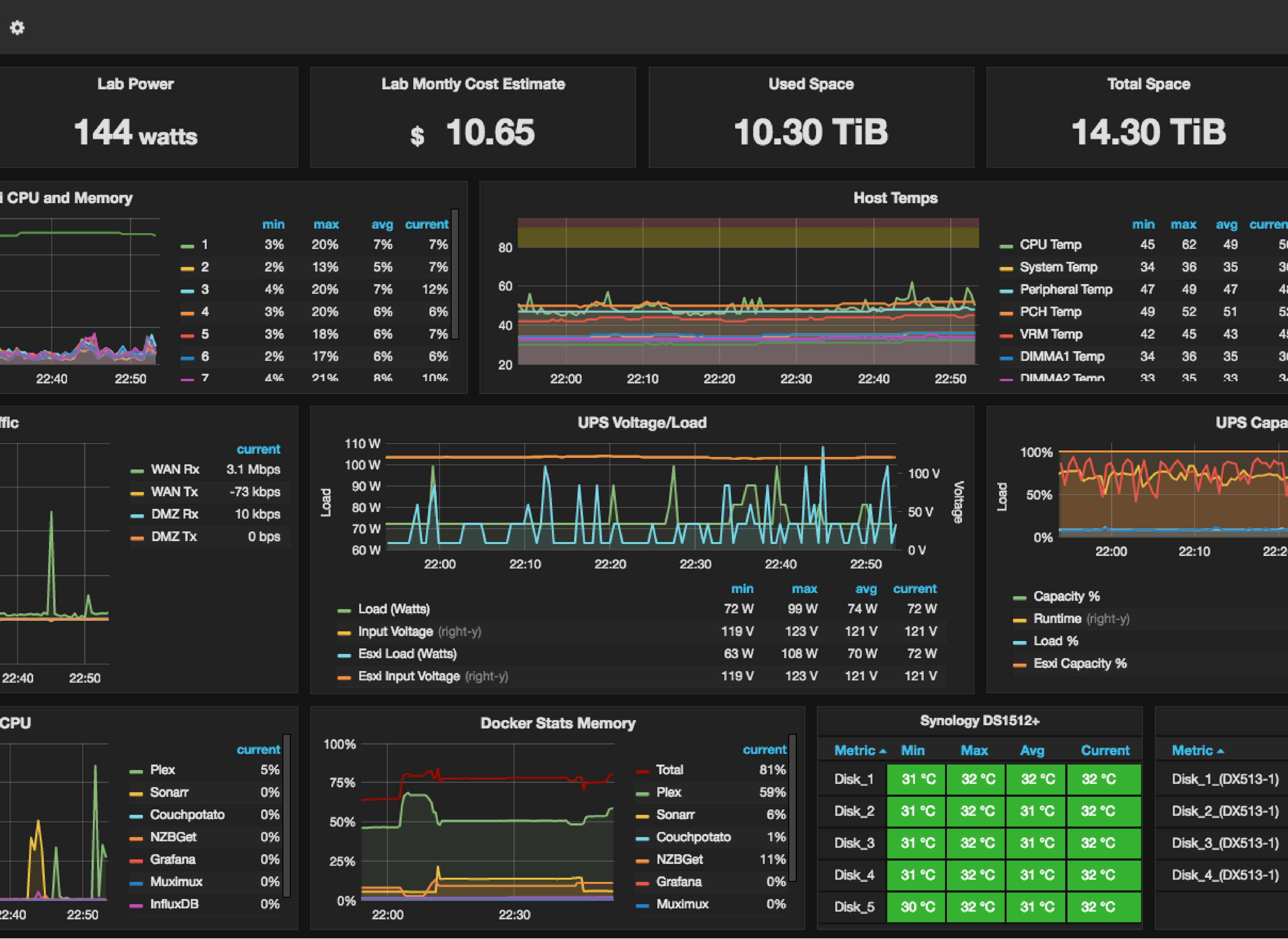
Prometheus Server
push alerts
pull metrics
Retrieval
Storage
PromQL
Web UI
Grafana
API clients
Jobs / Exporters
Node
HDD / SSD
Prometheus Server

Visualization Possibilities

- Prometheus Expression Browser
- Grafana
- Console Templates
- Own UI via Http API
  http://localhost:9090/api/v1/query?query=up



Lab Power

144 watts

Lab Montly Cost Estimate

$ 10.65

Used Space

10.30 TiB

Total Space

14.30 TiB

i CPU and Memory

	min	max	avg	current
1	3%	20%	7%	7%
2	2%	13%	5%	7%
3	4%	20%	7%	12%
4	3%	20%	6%	6%
5	3%	18%	6%	7%
6	2%	17%	6%	6%
7	4%	21%	8%	10%

Host Temps

	min	max	avg	curren
CPU Temp	45	62	49	5
System Temp	34	36	35	3
Peripheral Temp	47	49	47	4
PCH Temp	49	52	51	5
VRM Temp	42	45	43	4
DIMMA1 Temp	34	36	35	3
DIMMA2 Temp	33	35	33	3

ffic

	current
WAN Rx	3.1 Mbps
WAN Tx	-73 kbps
DMZ Rx	10 kbps
DMZ Tx	0 bps

UPS Voltage/Load

	min	max	avg	current
Load (Watts)	72 W	99 W	74 W	72 W
Input Voltage (right-y)	119 V	123 V	121 V	121 V
Esxi Load (Watts)	63 W	108 W	70 W	72 W
Esxi Input Voltage (right-y)	119 V	123 V	121 V	121 V

UPS Capa

- Capacity %
- Runtime (right-y)
- Load %
- Esxi Capacity %

CPU

	current
Plex	5%
Sonarr	0%
Couchpotato	0%
NZBGet	0%
Grafana	0%
Muximux	0%
InfluxDB	0%

Docker Stats Memory

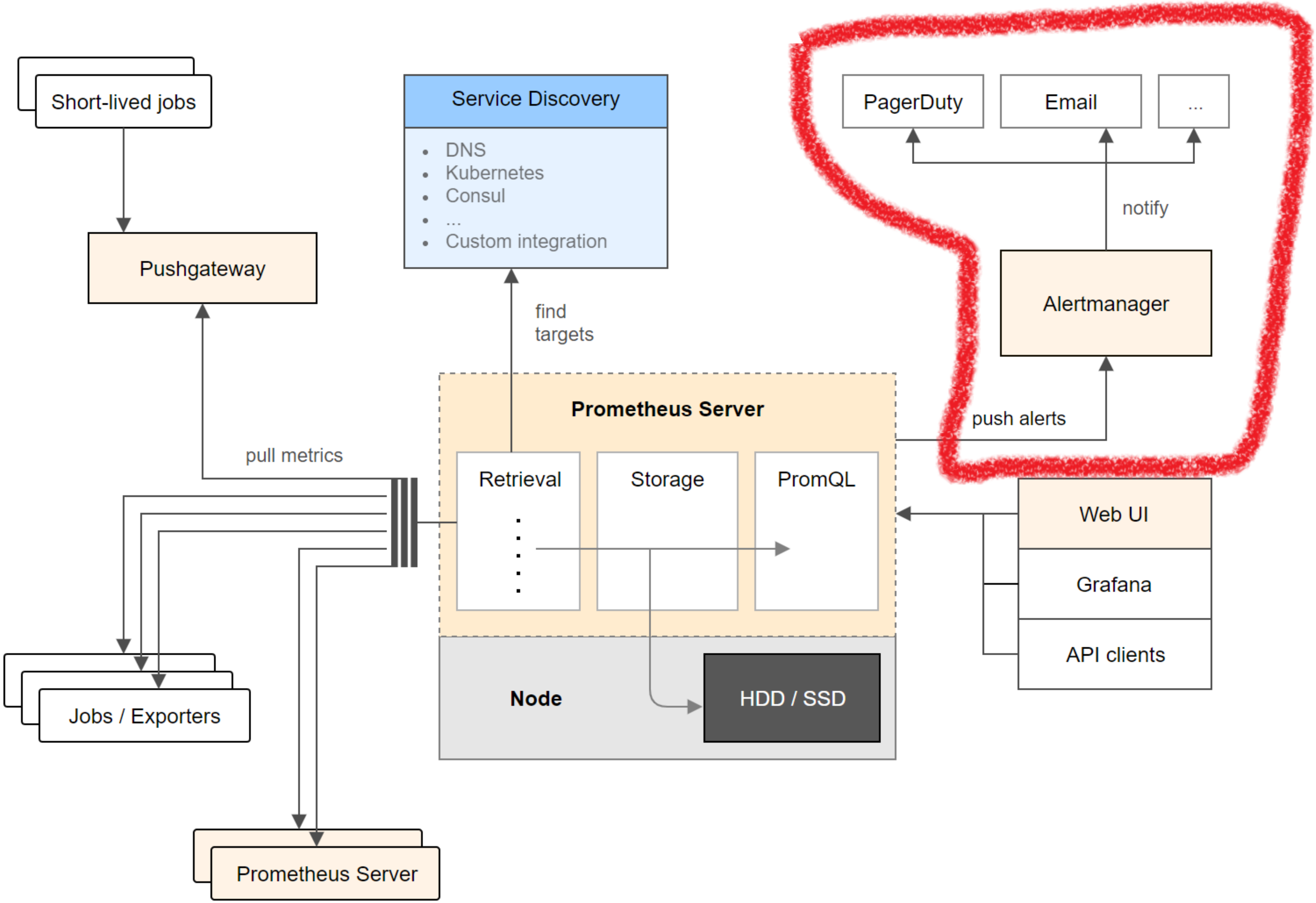
	current
Total	81%
Plex	59%
Sonarr	6%
Couchpotato	1%
NZBGet	11%
Grafana	0%
Muximux	0%

Synology DS1512+

Metric ▲	Min	Max	Avg	Current
Disk_1	31 °C	32 °C	32 °C	32 °C
Disk_2	31 °C	32 °C	31 °C	32 °C
Disk_3	31 °C	32 °C	31 °C	32 °C
Disk_4	31 °C	32 °C	31 °C	32 °C
Disk_5	30 °C	32 °C	31 °C	32 °C

Metric ▲
Disk_1_(DX513-1)
Disk_2_(DX513-1)
Disk_3_(DX513-1)
Disk_4_(DX513-1)

Alerting


Short-lived jobs
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PromQL
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Grafana
API clients
Node
HDD / SSD
Jobs / Exporters
Prometheus Server

Support for

mail , hipchat , pagerduty , pushover , slack , opsgenie , victorops , webhook

Prometheus Configuration

```
groups:
  - name: memory
    rules:
      - alert: memory
        expr: node_memory_MemAvailable < 8000000000
        for: 30s
        labels:
          severity: critical
        annotations:
          summary: "To less Memory"
          description: "{{ $labels.instance }} has little mem"
```

Prometheus Configuration

```yaml
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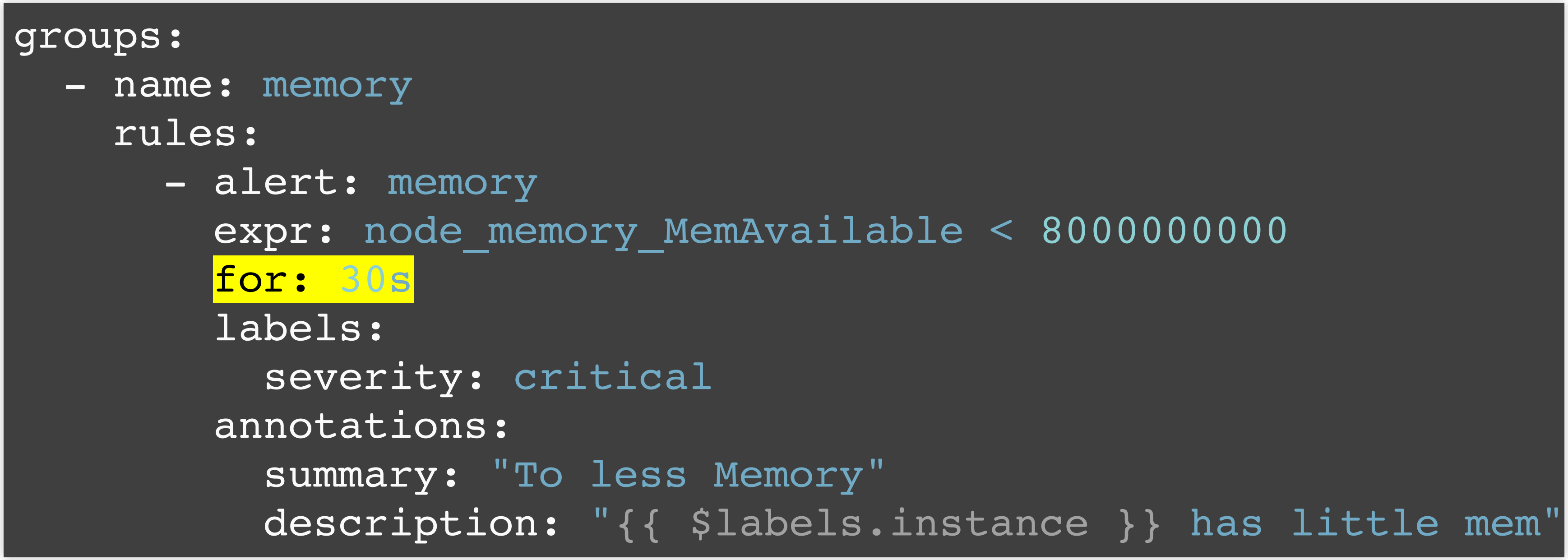
Prometheus Configuration



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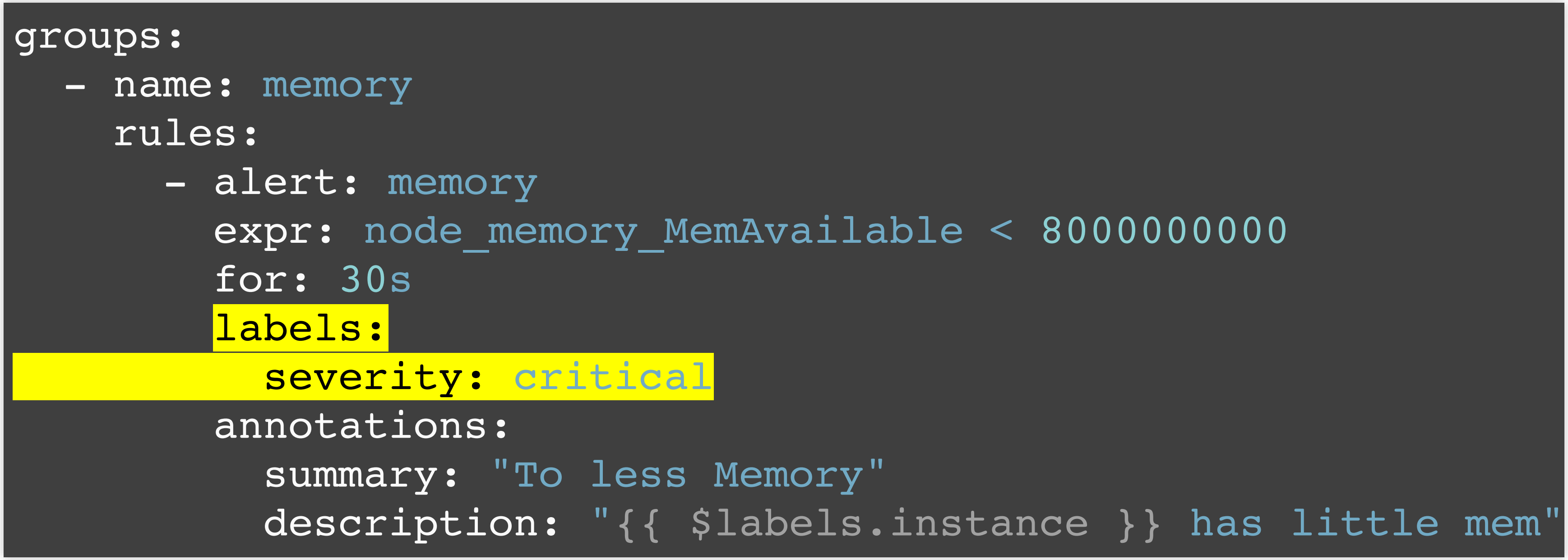

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        annotations:
          summary: "To less Memory"
          description: "{{ $labels.instance }} has little mem"
```

Alertmanager Configuration

```
route:
  receiver: 'devs'
  group_by: [alertname]
  group_wait: 30s
  group_interval: 1m
  repeat_interval: 1h
receivers:
  - name: 'devs'
    email_configs:
      - to: 'steve@gmail.com'
```

Alertmanager Configuration

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  group_by: [alertname]
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Alertmanager Configuration

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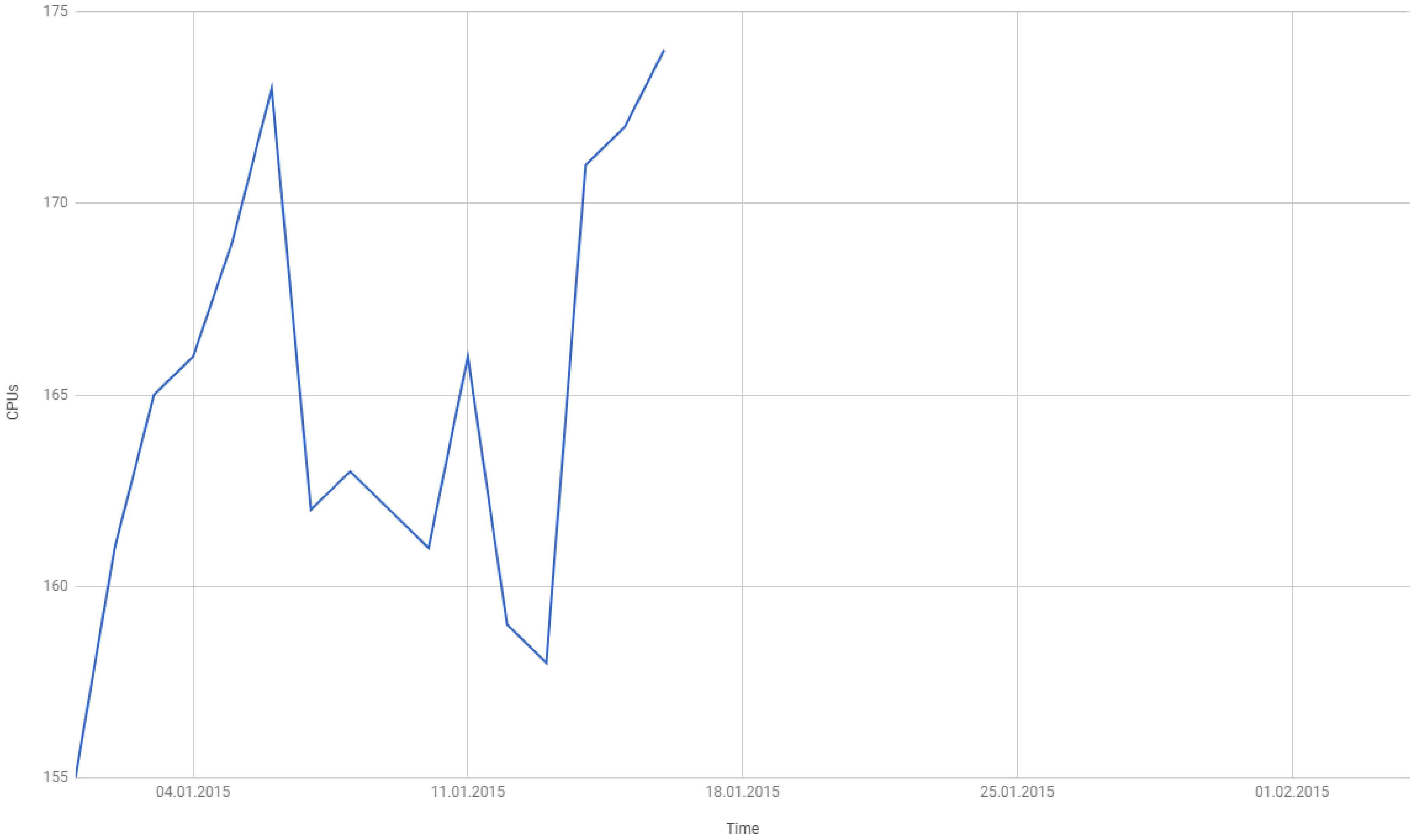
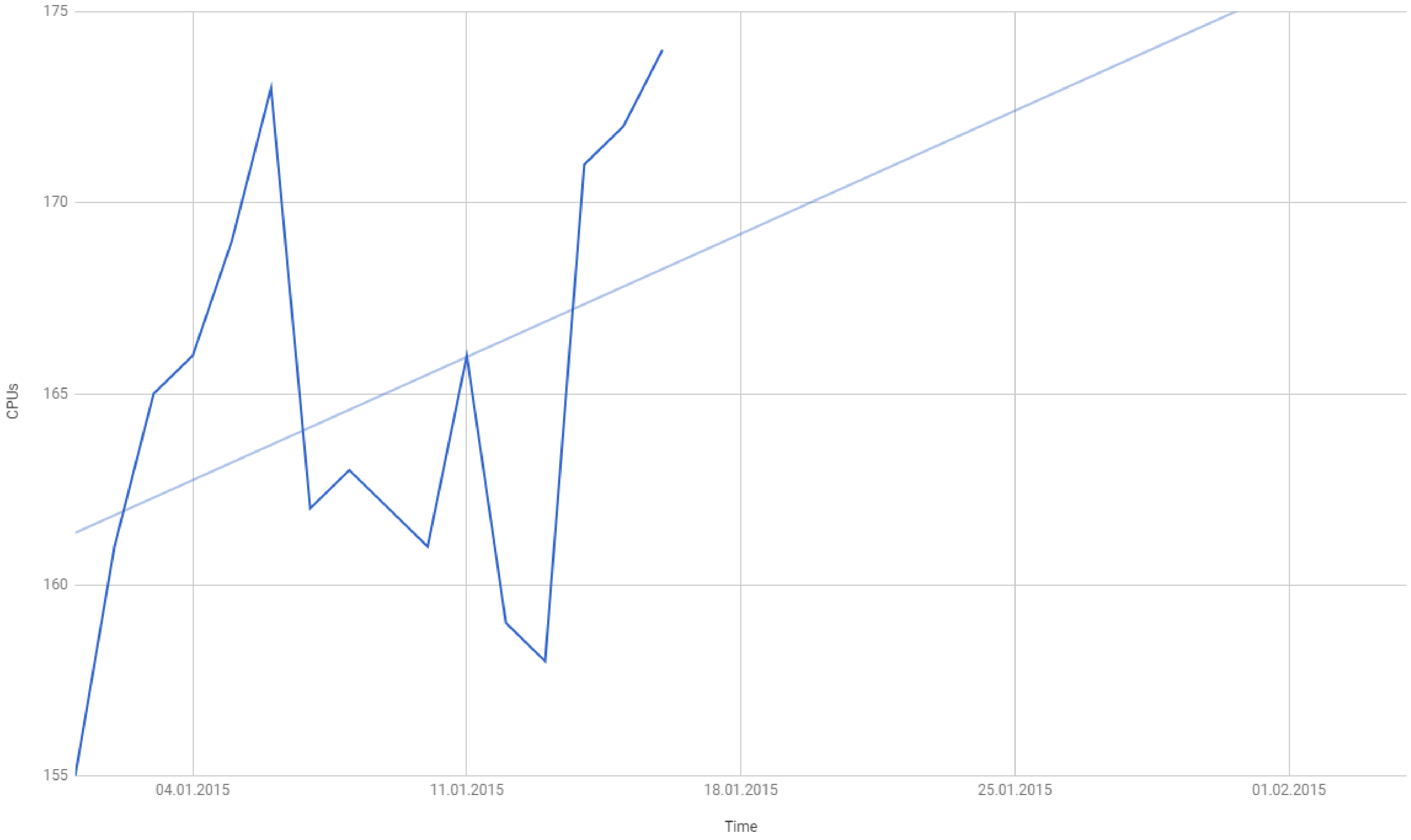
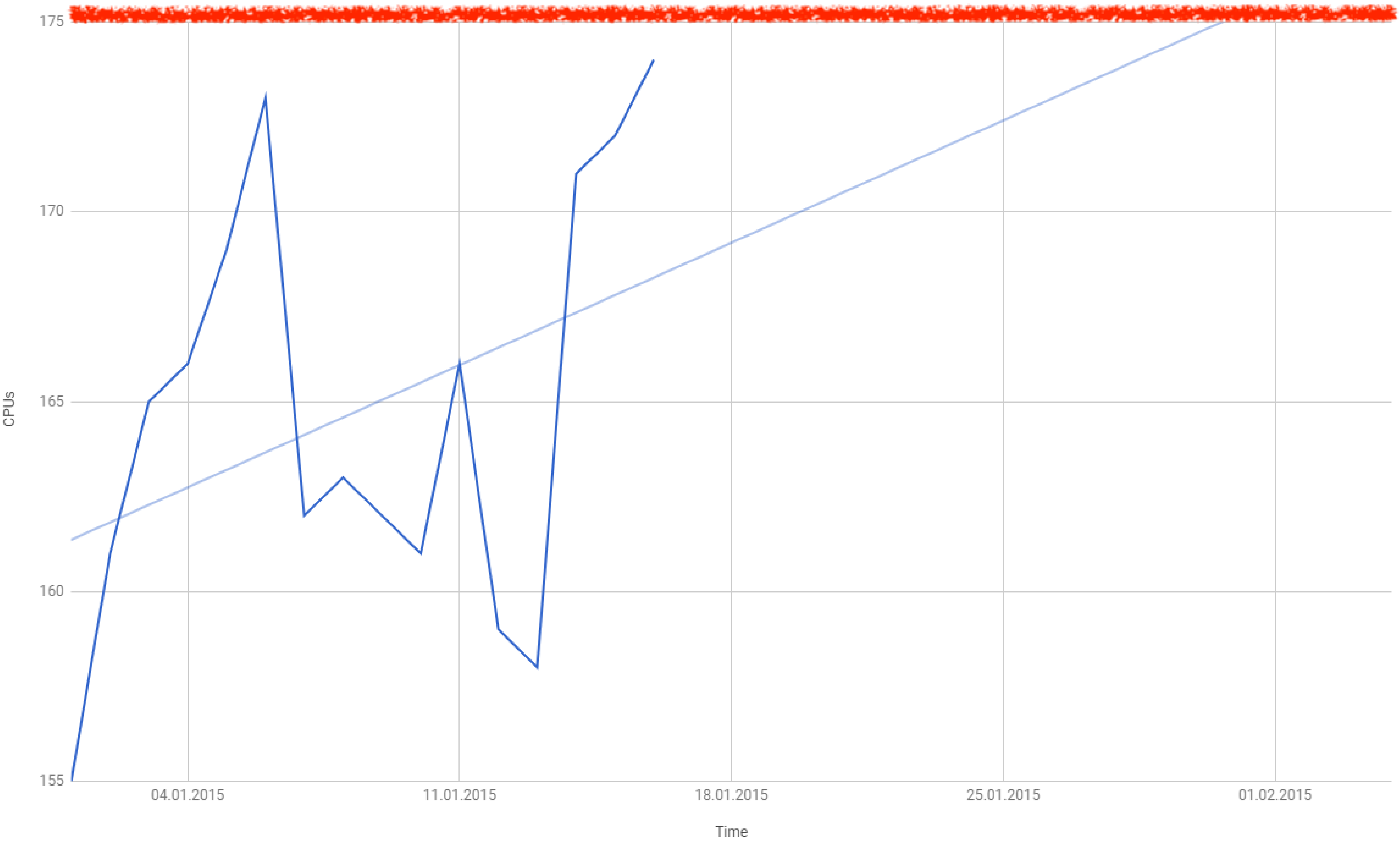
receivers:
  - name: 'devs'
    email_configs:
      - to: 'steve@gmail.com'
```

Predicting the Future


175
170
165
160
155
CPUs
04.01.2015
11.01.2015
18.01.2015
25.01.2015
01.02.2015
Time


175
170
165
160
155
CPUs
04.01.2015
11.01.2015
18.01.2015
25.01.2015
01.02.2015
Time


175
170
165
160
155
CPUs
04.01.2015
11.01.2015
18.01.2015
25.01.2015
01.02.2015
Time

Prometheus Configuration

```
groups:
  - name: disk
    rules:
      - alert: disk
        expr: predict_linear(
                node_filesystem_free{job="node"}[7d],
                7 * 24 * 3600) < 0
        for: 30s
        labels:
          severity: critical
        annotations:
          summary: "Disk Space Prediction Warning"
          description: "{{ $labels.instance }} will run out
                          of disk space in 7 days"
```

Prometheus Configuration

```
groups:
  - name: disk
    rules:
      - alert: disk
        expr: predict_linear(
                node_filesystem_free{job="node"}[7d],
                7 * 24 * 3600) < 0
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          severity: critical
        annotations:
          summary: "Disk Space Prediction Warning"
          description: "{{ $labels.instance }} will run out
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Thank you

@stroe_bit