



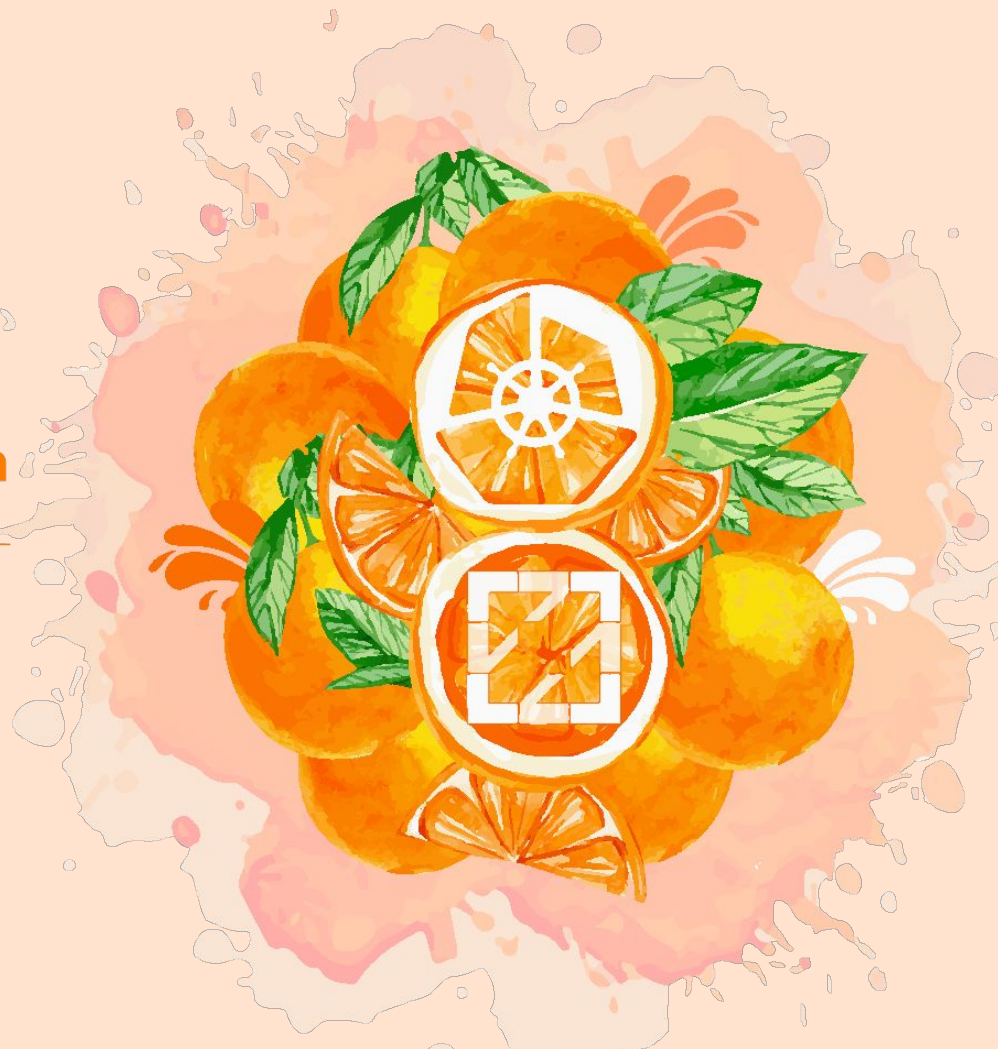
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kubectl events

The Soul of a New Command

Bryan Boreham, Grafana Labs





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Who am I?

Bryan Boreham

Distinguished Engineer, Grafana Labs.

40-year career in software.

Maintainer of Mimir, Cortex, Weave Scope.

Ex-CNI maintainer.



@bboreham

Outline

How did I get here?

What are Events?

The lifecycle of a Kubernetes enhancement.

How a kubectl command is structured.

Helper libraries to fetch and print Kubernetes objects.

Future directions.



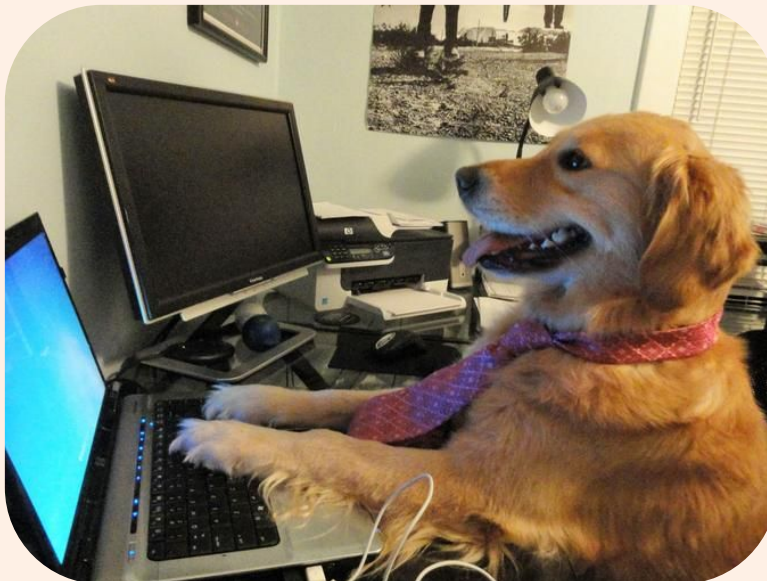
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How did I get here?



"Kspan"

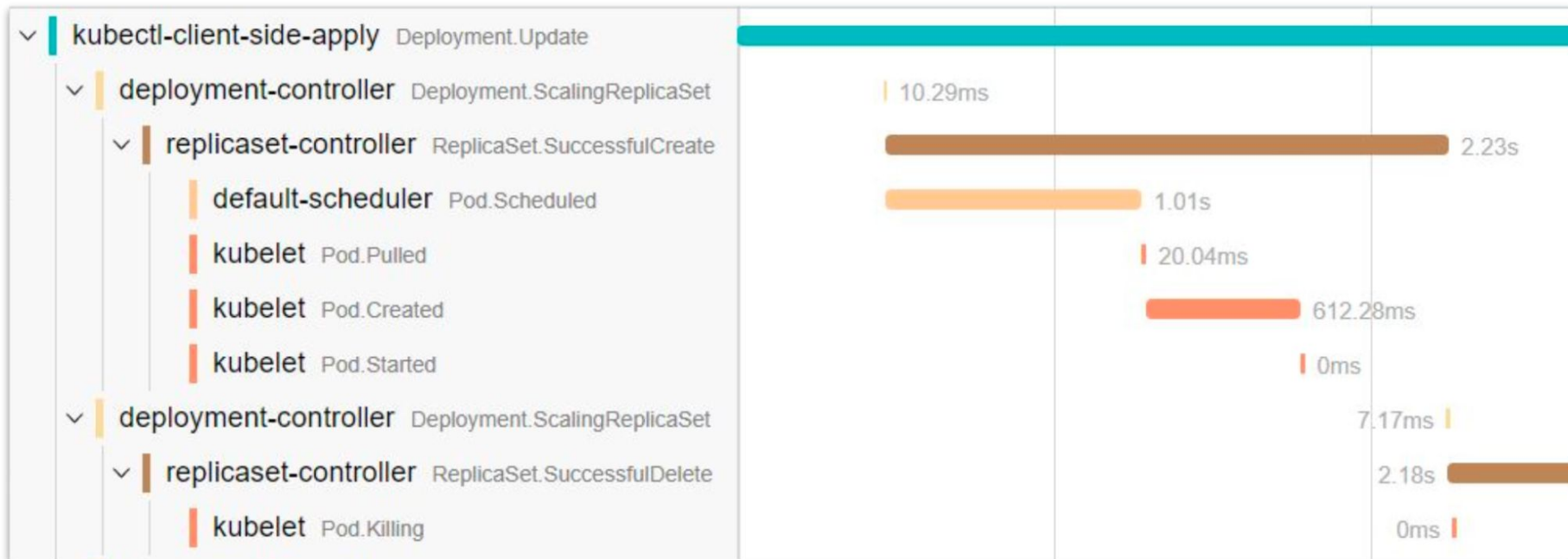


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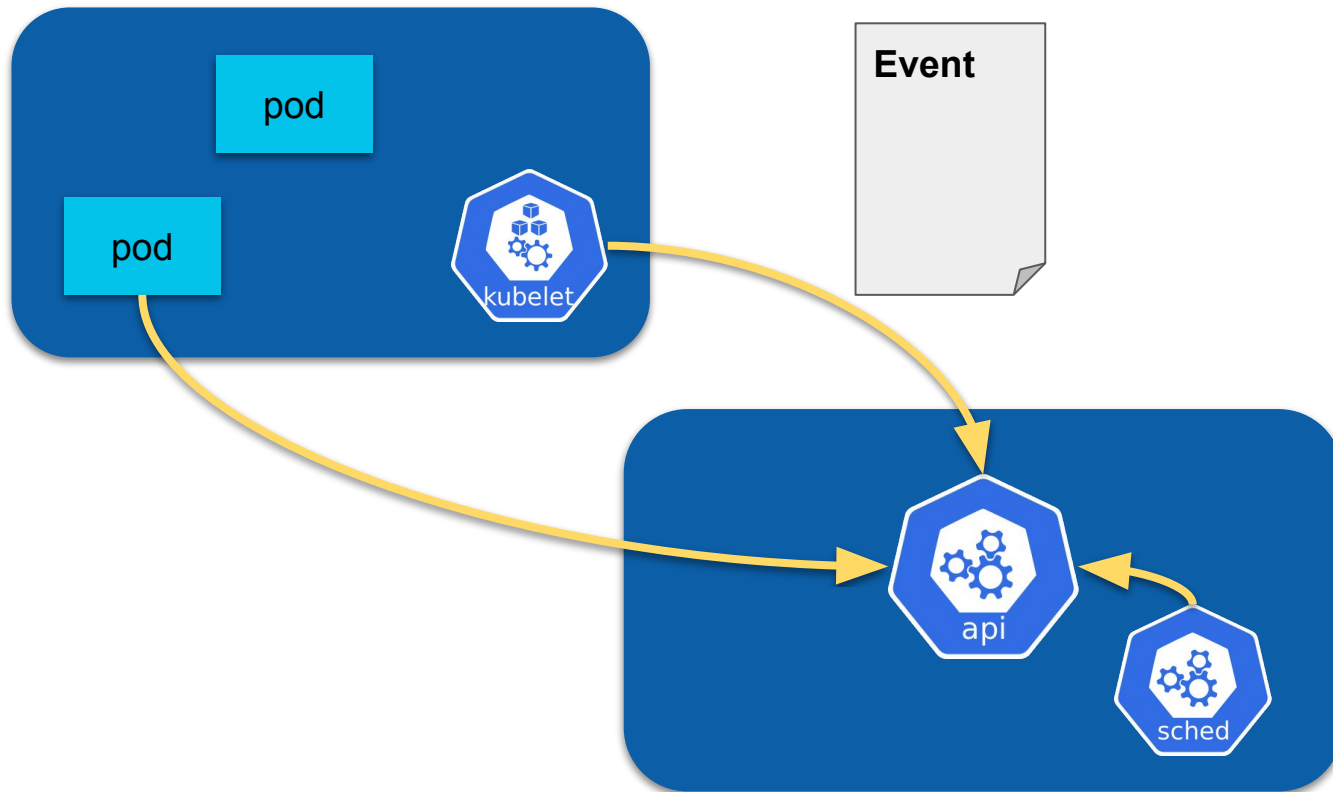
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<https://github.com/weaveworks-experiments/kspan>

What are Events, in Kubernetes?



Let's see some Events

```
$ kubectl get events
```

LAST SEEN	TYPE	REASON	OBJECT	MESSAGE
13s	Normal	Killing	pod/q-5c84-55g	Stopping container x
8s	Normal	Scheduled	pod/q-5c84-wf6	Successfully assigned default/q-5c84-wf6 to node-1
9s	Normal	Pulled	pod/q-5c84-wf6	Container image "foo:2.0" already present on machine
8s	Normal	Created	pod/q-5c84-wf6	Created container x
8s	Normal	Started	pod/q-5c84-wf6	Started container x
10s	Normal	Successful Create	replicaset/q-5c84	Created pod: q-5c84-wf6

Inside an Event



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```
apiVersion: v1
kind: Event
metadata:
  name: px-78bb79-wfzrk.16185b1c1d668
  namespace: default
type: Normal
count: 1
firstTimestamp: "2022-02-08T10:39:04Z"
lastTimestamp: "2022-02-08T10:39:04Z"
```

```
message: "Created container x"
reason: Created
source:
  component: kubelet
  host: node1
involvedObject:
  apiVersion: v1
  kind: Pod
  name: px-78bb79-wfzrk
  namespace: default
```

Issues with 'kubectl get events'

- kubectl get events doesn't sort events by last seen time [kubernetes#29838](#) opened 1 Aug 2016
- Improve watch behavior for events [kubernetes#65646](#), [kubectl#793](#),
- Improve events printing [kubectl#704](#), [kubectl#151](#)
- kubectl get events should give a timeline of events [kubernetes#36304](#)



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Encouragement from the community

"This seems like a simple change"

"How is this even an open issue after 4 year's is beyond me"

"This is still happening, is there any timeline to fix this?"

"Seriously? Looking at a history with a random order of the event isn't an issue for you?"

"This is still driving me nuts"



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What is going on?



There are two versions of Event !

`k8s.io/api/core/v1`

- This is the original

`k8s.io/api/events/v1`

- Described in [KEP-383](#) *"Redesign Event API"*

k8s.io/client-go/tools/record (core/v1)



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```
return &v1.Event{
    InvolvedObject: *ref,
    Reason:          reason,
    Message:         message,
    FirstTimestamp:  t,
    LastTimestamp:   t,
    Count:           1,
    Type:            eventtype,
}
```

k8s.io/client-go/tools/events (events.k8s.io/v1)

```
return &eventsv1.Event{  
    Regarding:    *refRegarding,  
    Related:      refRelated,  
    Reason:       reason,  
    Note:         message,  
    Action:       action,  
    EventTime:    timestamp,  
    Series:       nil,  
    Type:         eventtype,  
}
```



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The Kubernetes Enhancement Process



Kubernetes Enhancement Process

Provisional

KEP has been proposed and is actively being defined.

Owning SIG has accepted that this work must be done.

Implementable

Approvers have approved this KEP for implementation.

Implemented

KEP has been implemented and is no longer actively changed.

(or deferred, rejected, withdrawn, replaced.)

KEP-1440: kubectl events

Provisional

08 Oct 2019

Implementable

27 Jan 2020

Implemented?

PR opened 28 Feb 2021

Merged 29 Oct 2021

Released as Alpha in
K8s 1.23, 7 Dec 2021



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'kubectl events'



Kubect! events

```
$ kubectl alpha events
```

LAST SEEN	TYPE	REASON	OBJECT	MESSAGE
13s	Normal	Killing	pod/q-5c84-55g	Stopping container x
10s	Normal	Successful Create	replicaset/q-5c84	Created pod: q-5c84-wf6
9s	Normal	Pulled	pod/q-5c84-wf6	Container image "foo:2.0" already present on machine
8s	Normal	Scheduled	pod/q-5c84-wf6	Successfully assigned default/q-5c84-wf6 to node-1
8s	Normal	Created	pod/q-5c84-wf6	Created container x
8s	Normal	Started	pod/q-5c84-wf6	Started container x

Kubectl events options

List recent events in the default namespace.

```
kubectl alpha events
```

List recent events in all namespaces.

```
kubectl alpha events --all-namespaces
```

List recent events for the specified pod, then wait for more events and list them as they arrive.

```
kubectl alpha events --for pod/web-pod-13je7 --watch
```



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So how do you add a command to kubectl?





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Step 0: cobra.Command

```
cmd.AddCommand(events.NewCmdEvents(f, streams))
```

```
...
```

```
func NewCmdEvents(f, streams) *cobra.Command {  
    flags := NewEventsFlags(f, streams)  
    cmd := &cobra.Command{  
        ...  
        Run: func(cmd *cobra.Command, args []string) {  
            o, err := flags.ToOptions(cmd.Context(), args)  
            cmdutil.CheckErr(err)  
            cmdutil.CheckErr(o.Run())  
        },  
    }  
}
```

```
staging/src/k8s.io/kubectl/pkg/cmd/alpha.go
```



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Step 1: capture CLI Flags

```
kubectl alpha events --namespace my-ns --for pod/web-pod-13je7
```

```
type EventsFlags struct {  
    RESTClientGetter genericclioptions.RESTClientGetter  
  
    AllNamespaces bool  
    Watch          bool  
    ForObject      string  
}
```




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Step 2: Map CLI flags to Options

```
kubectl alpha events --namespace my-ns --for pod/web-pod-13je7
```

```
type EventsOptions struct {  
    Namespace      string  
    AllNamespaces bool  
    Watch          bool  
  
    forGVK schema.GroupVersionKind  
    forName string  
}
```



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Step 3: build an api-server request

```
o.NewBuilder().  
    Unstructured().  
    NamespaceParam(o.Namespace).DefaultNamespace().  
        AllNamespaces(o.AllNamespaces).  
    LabelSelectorParam(o.Selector).  
    ResourceTypeOrNameArgs(true, o.BuilderArgs...).  
    Flatten().  
    Do()
```



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Detour: we need to query on
`'involvedObject.Kind'`





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Recap: an Event

```
apiVersion: v1
kind: Event
metadata:
  name: px-78bb79-wfzrk.16185b1c1d668
  namespace: default
type: Normal
count: 1
firstTimestamp: "2022-02-08T10:39:04Z"
lastTimestamp: "2022-02-08T10:39:04Z"
```

```
message: "Created container x"
reason: Created
source:
  component: kubelet
  host: node1
involvedObject:
  apiVersion: v1
  kind: Pod
  name: px-78bb79-wfzrk
  namespace: default
```

Kubernetes API Resources

```
$ kubectl api-resources
```

NAME	SHORTNAMES	APIVERSION	NAMESPACED	KIND
configmaps	cm	v1	true	ConfigMap
endpoints	ep	v1	true	Endpoints
events	ev	v1	true	Event
limitranges	limits	v1	true	LimitRange
namespaces	ns	v1	false	Namespace
nodes	no	v1	false	Node
pods	po	v1	true	Pod



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Filtering Events for an object

```
import "k8s.io/apimachinery/pkg/fields"
```

```
...
```

```
listOptions.FieldSelector = fields.AndSelectors(  
    fields.OneTermEqualSelector("involvedObject.kind", gvk.Kind),  
    fields.OneTermEqualSelector("involvedObject.name", name))
```



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Finding the correct Kind name

```
mapper, err := flags.RESTClientGetter.ToRESTMapper()  
gvr := schema.GroupVersionResource{Resource: resource}  
gvr, err = mapper.ResourceFor(gvr)  
gvk, err := mapper.KindFor(gvr)
```



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Step 4: execute the command

```
err := resource.FollowContinue(&listOptions,  
    func(options metav1.ListOptions) (runtime.Object,  
error) {  
    objects, err := e.List(o.ctx, options)  
    // deal with objects  
})
```


It's not so hard after all!

1. Add your Cobra command
2. Set up Flags
3. Convert Flags to Options
4. Execute the command



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Breathe.



Recap KEP-1440: kubectl events

- kubectl get events doesn't sort events by last seen time [kubernetes#29838](#) opened 1 Aug 2016
- Improve watch behavior for events [kubernetes#65646](#), [kubectl#704](#)
- Events query is too specific in describe [kubectl#147](#)
- kubectl get events should give a timeline of events [kubernetes#36304](#)
- kubectl get events should provide a way to combine (union) of columns [kubernetes#82950](#)

The future!



- kubectl get events should give a timeline of events [kubernetes#36304](#)
 - Could be 'kubectl events --since'
- Extend to "related" objects?
- What would you like?



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Questions?



@bboreham





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