Custom Kubernetes Schduler

SINA SHARIATI

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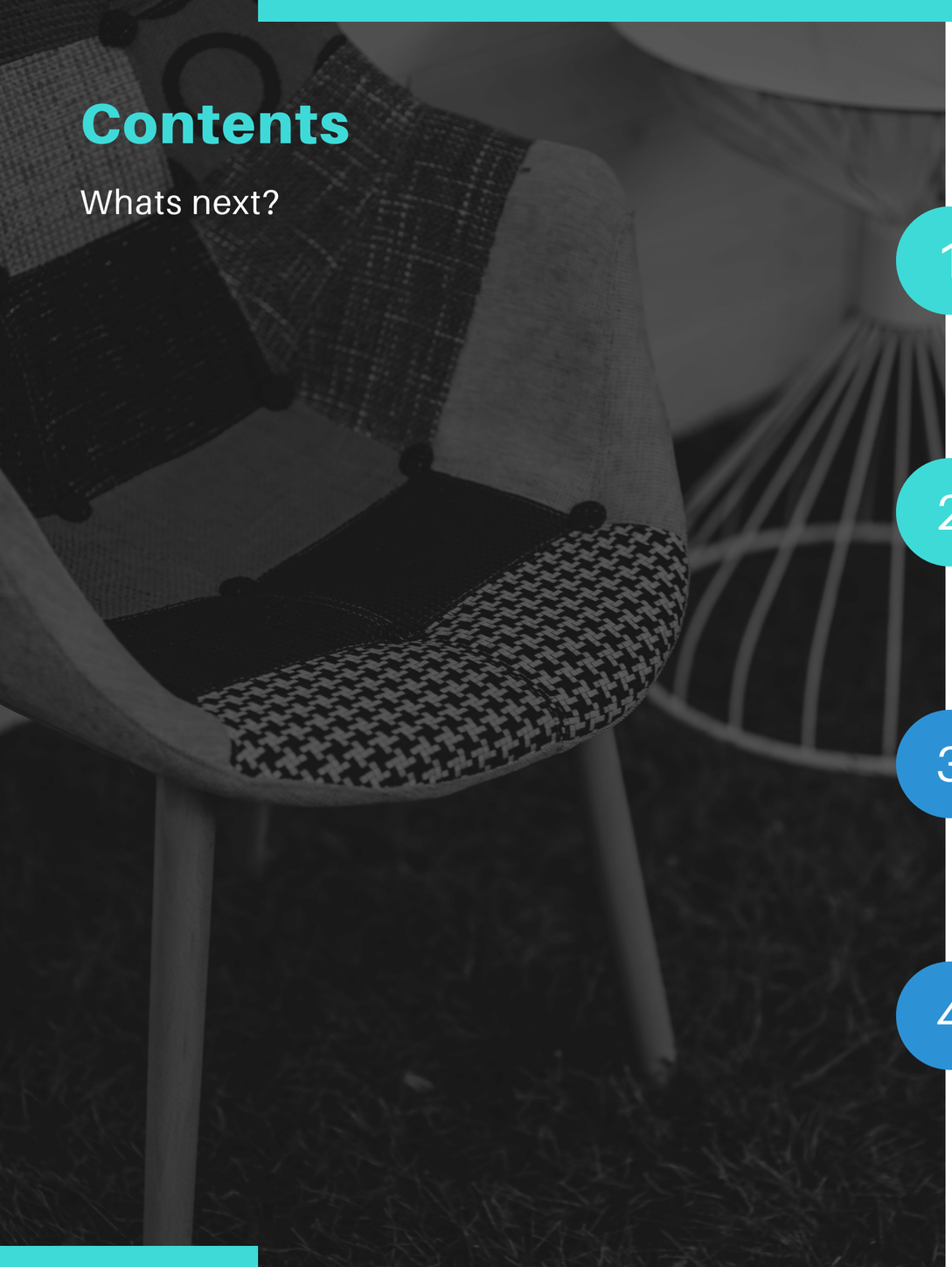

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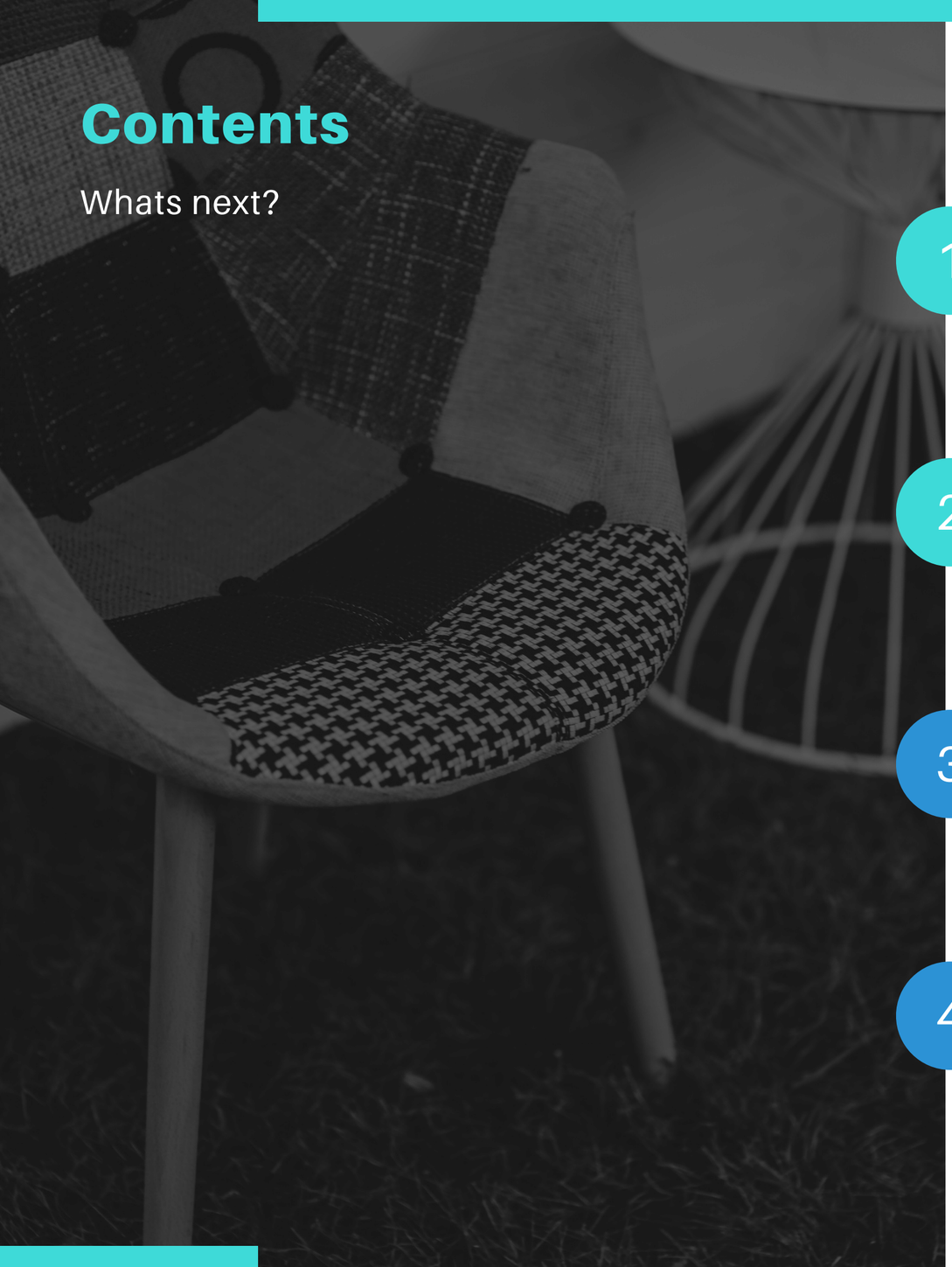

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$ whoami

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- Currently, software engineer at snapp! - offering team

LINKS

github.com/noisyboy-9

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sina-shariati

Noisyboy-9 - Overview

22 y.o backend web developer and CE student at AUT. - Noisyboy-9

GitHub

RELATED PROJECTS

- Colousses: Scheduling Algorithm Arena
- ECMUS: Fragmentation aware cloud-assisted edge scheduler (contributor)

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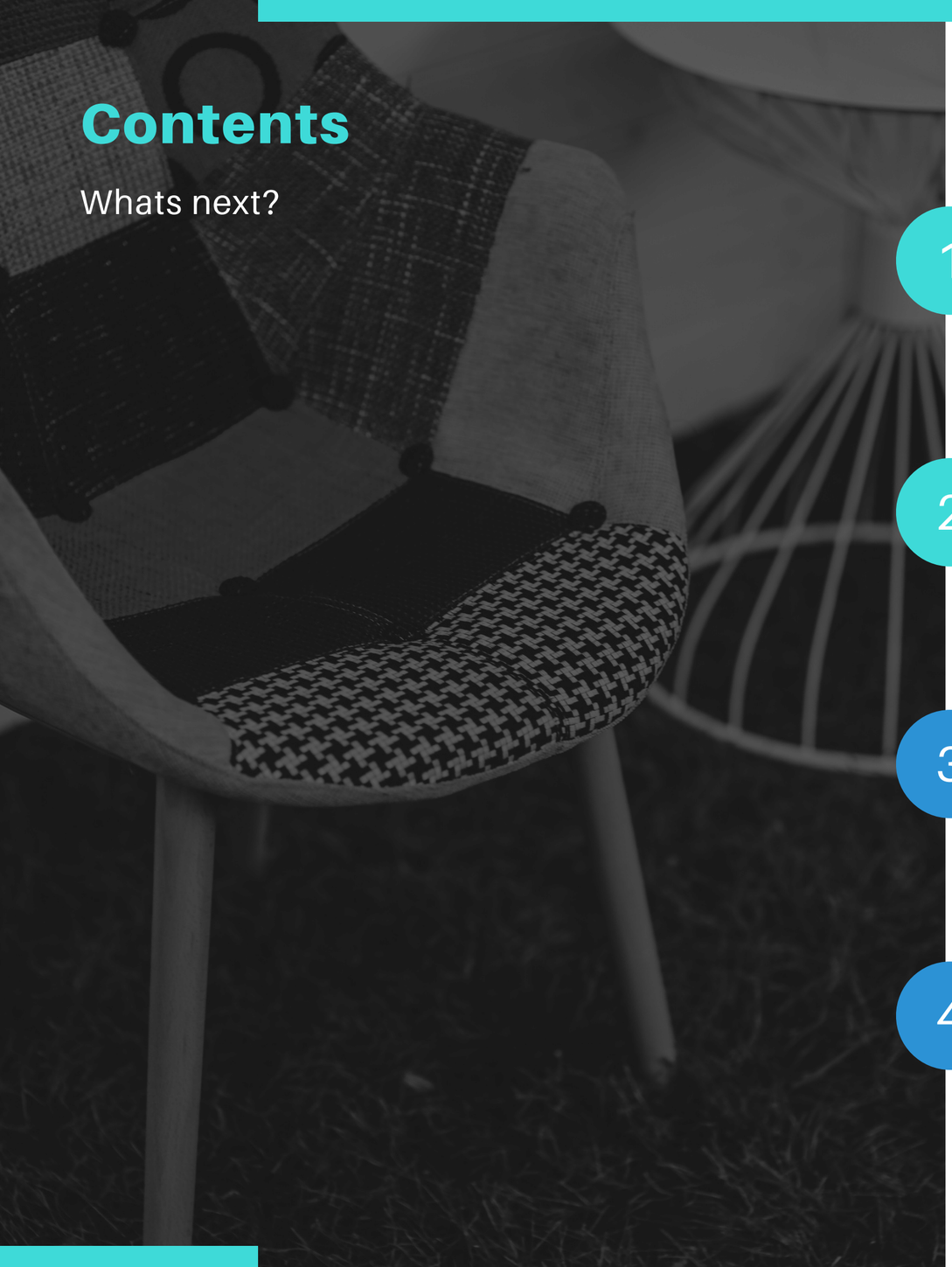

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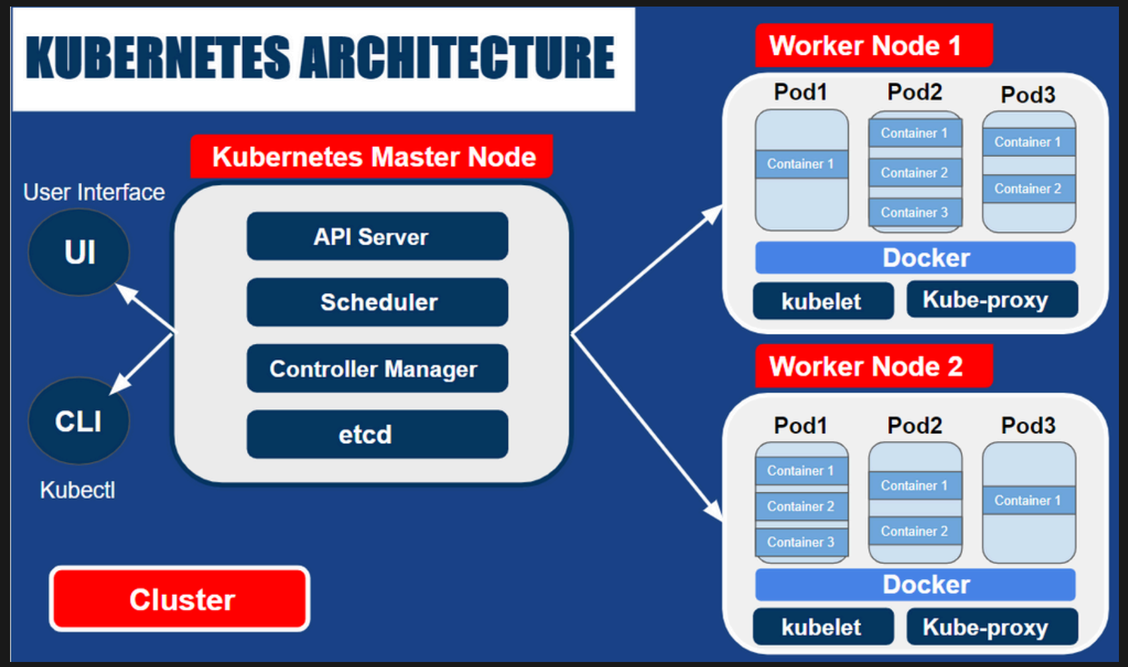
What?

- The scheduler is a part of the control plane (master node), that schedules pods to nodes.
- In Kubernetes, scheduling refers to making sure that Pods are matched to Nodes so that Kubelet can run them.
- Kube-scheduler: K8s default scheduler **BUT REPLACEABLE!**



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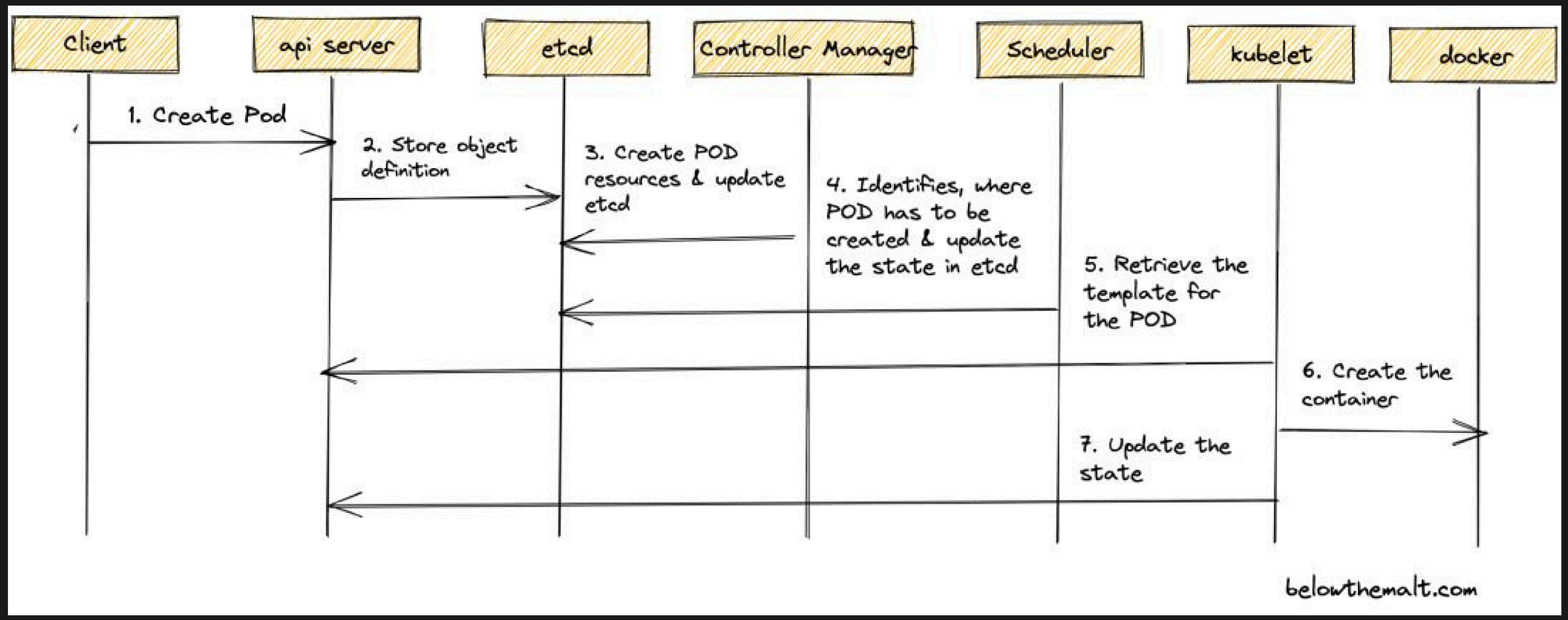
Scheduling Flow

- In kubernetes, the flow that starts from deployment creation and leads to pod allocation on the node is often called **Scheduling Flow.**



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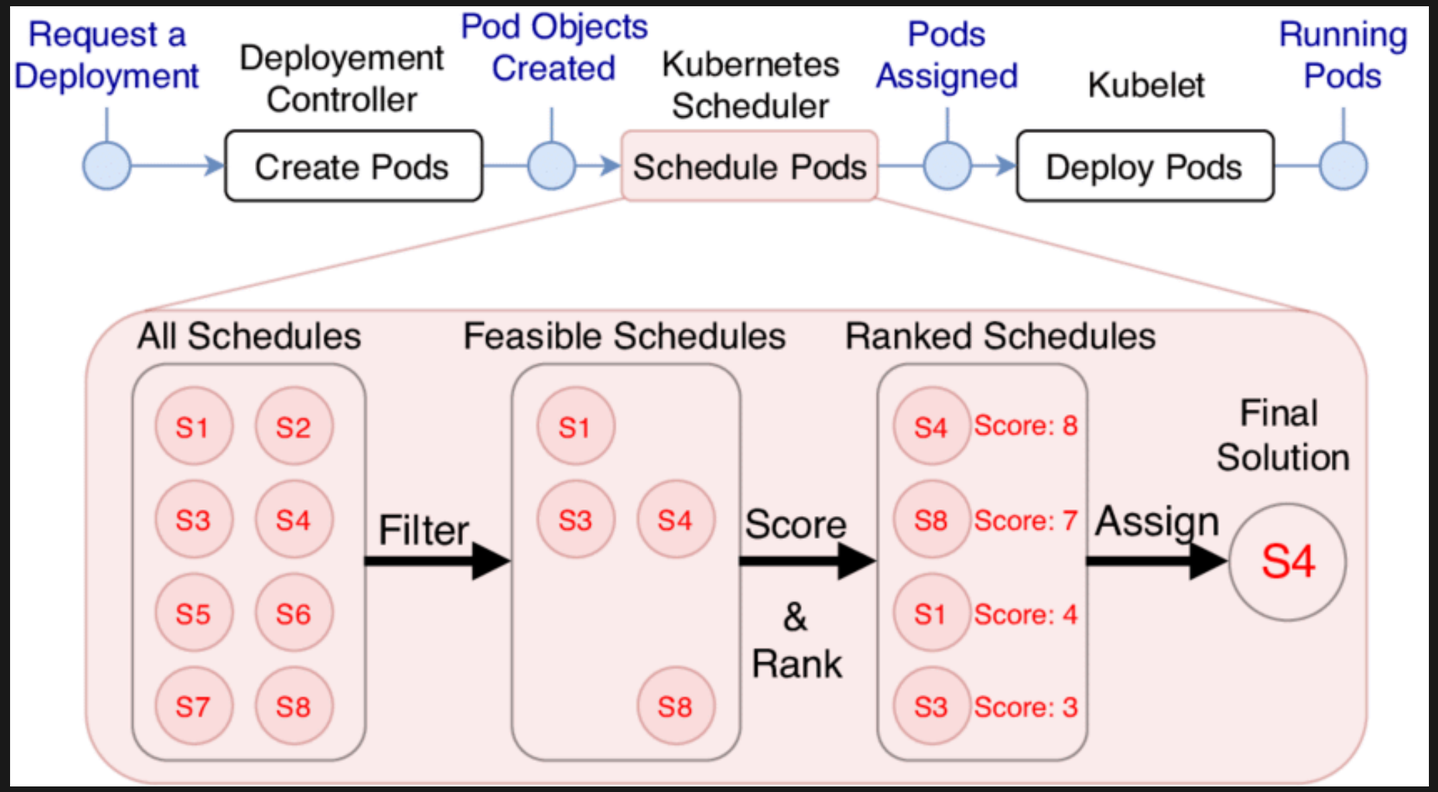
Scheduling Flow (cont.)

- Kube-scheduler has two phases: **Filtering and scoring**
- In the filtering phase, unfeasible nodes are filtered
- In scoring, a weighted some of scores for pod allocation is calculated
- The node with the highest score is chosen for binding.



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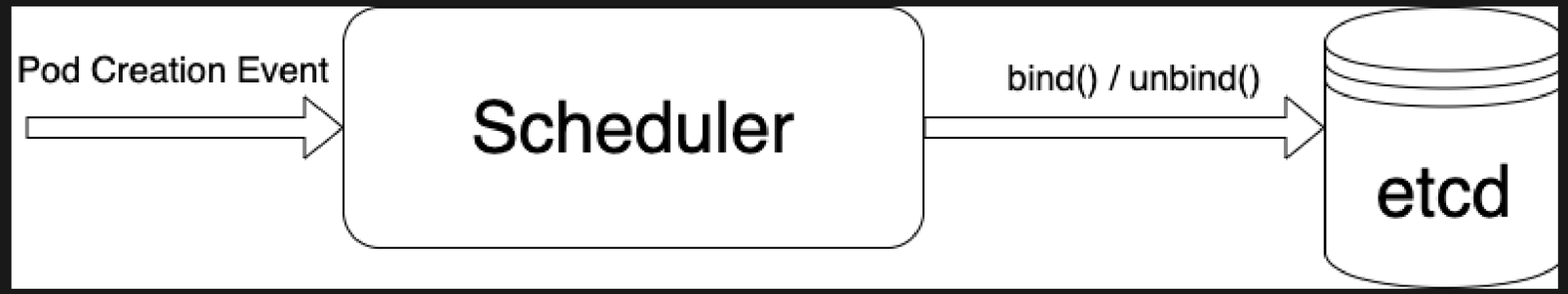
Scheduling Flow (cont.)

- The scheduler is responsible for finding the feasible node for the pod.
- So, the scheduler isn't responsible for:
  - Notifying Kubelet of the worker node to create the new pod (etcd & kube-controllers)
  - Monitoring pod creation routines (Kubelet)
  - handle pod binding error (Kubelet, API-server, and controllers)
- Scheduler calls bind(pod, selected_node) in its source code and etcd gets updated and the rest of the process is other components' responsibilities!
- So the scheduler API is something like this:



- This architecture is a huge advantage for writing a custom scheduler!

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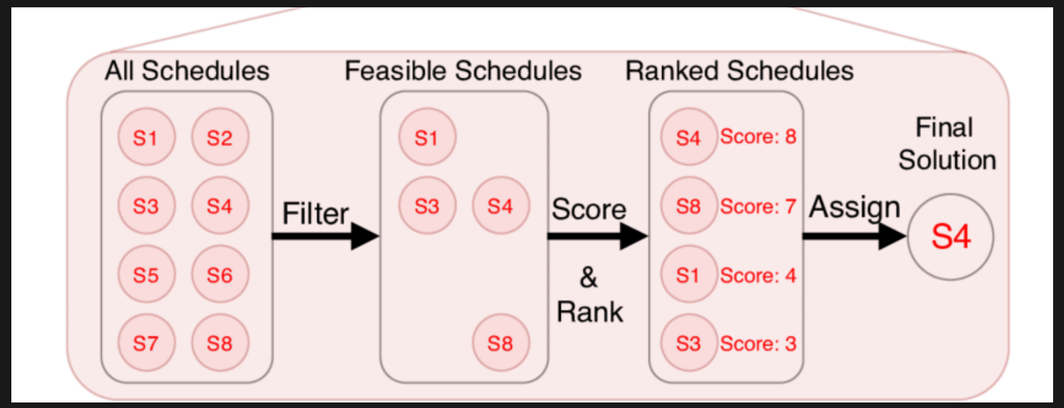
Fiddling with kube-scheduler!

- There is 2 main way to fiddle with the kubernetes scheduler:
  - Writing custom scorer plugin
  - Using k8s default options (e.g. node selector, taint and toleration, and etc)
- Default options are mostly for the **Filtering Phase**
- Custom scorer is for **Ranking Phase.**



- Kube-scheduler is mostly optimized for **pod spreading.** This its nature and can't be that much fiddled with!
- **Question:** What if we want to change this behavior?
- **Solution:** Write your own custom scheduler!

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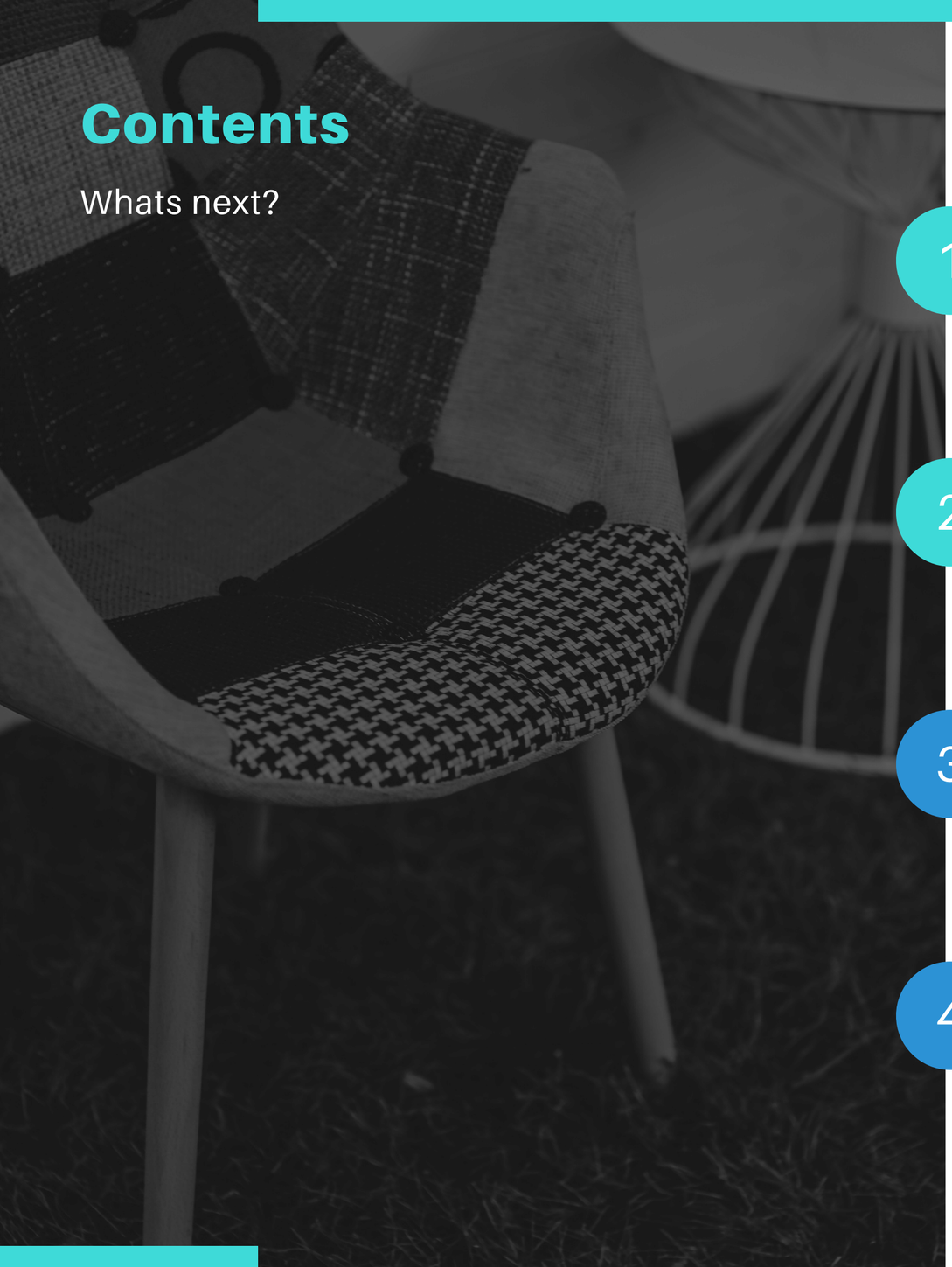

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Why?

- **Is it hard to write a custom scheduler?** Yes it is not!
- Writing a simple scheduler is easy.
- It is extremely hard when you have to take into account:
  - Scalability
  - Availability
  - Good algorithms design
  - etc

- Some use cases for writing a custom scheduler:
  - **AIaas**: Kube-scheduler isn't optimized for AI deployments
  - **Edge computing**: Using edge computing paradigm
  - **Better algorithm**: Scheduling is NP-Hard by nature. You have a better algorithm?
  - **Learning**: it is one of the best ways to learn the inner workings of k8s
  - **Fun**: it is a very cool project to have in your resume!

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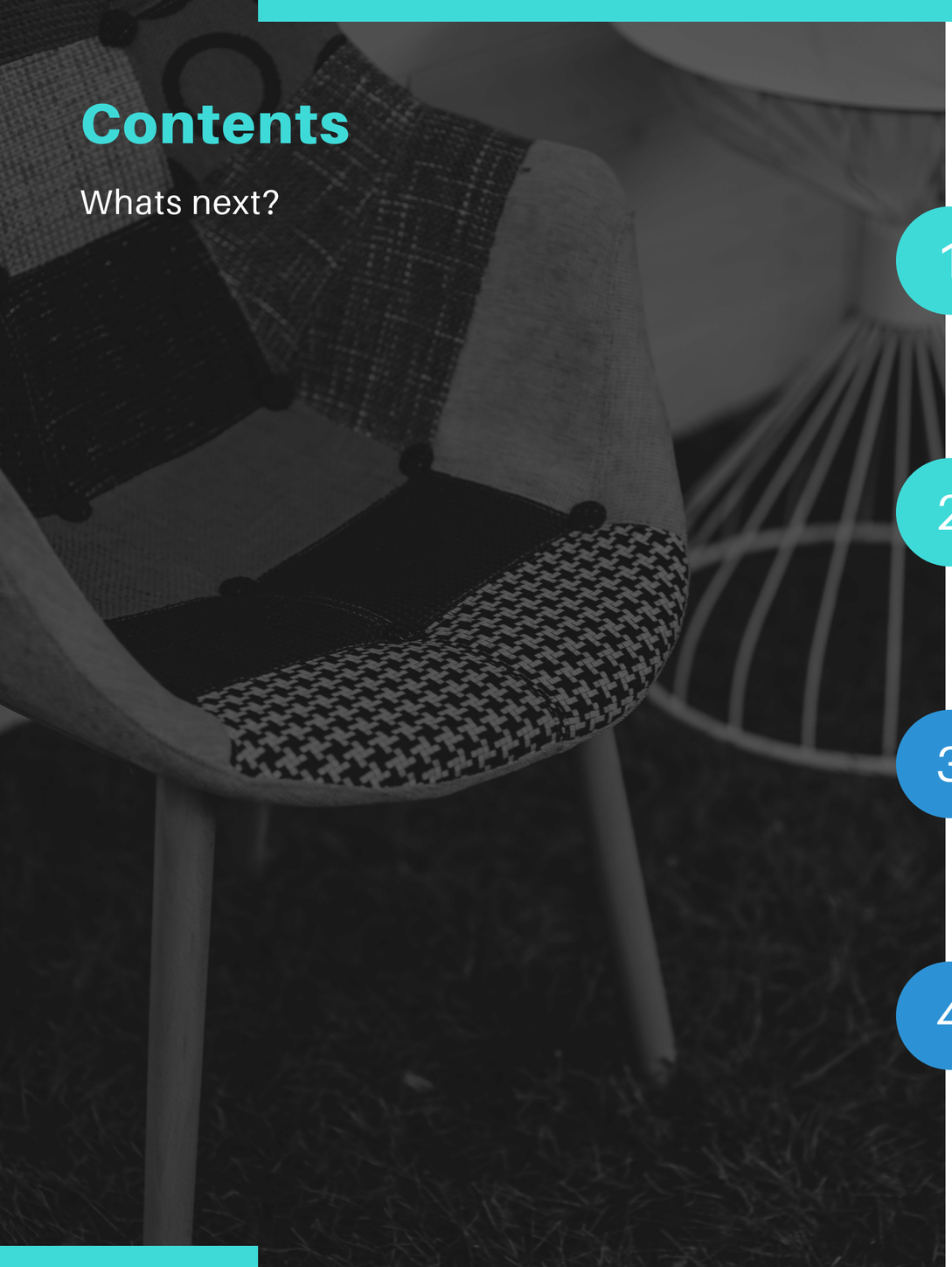
But first . . .

Welcome to project Lattary!

Coding Time!

Welcome to project cutom_k8s_scheduler!



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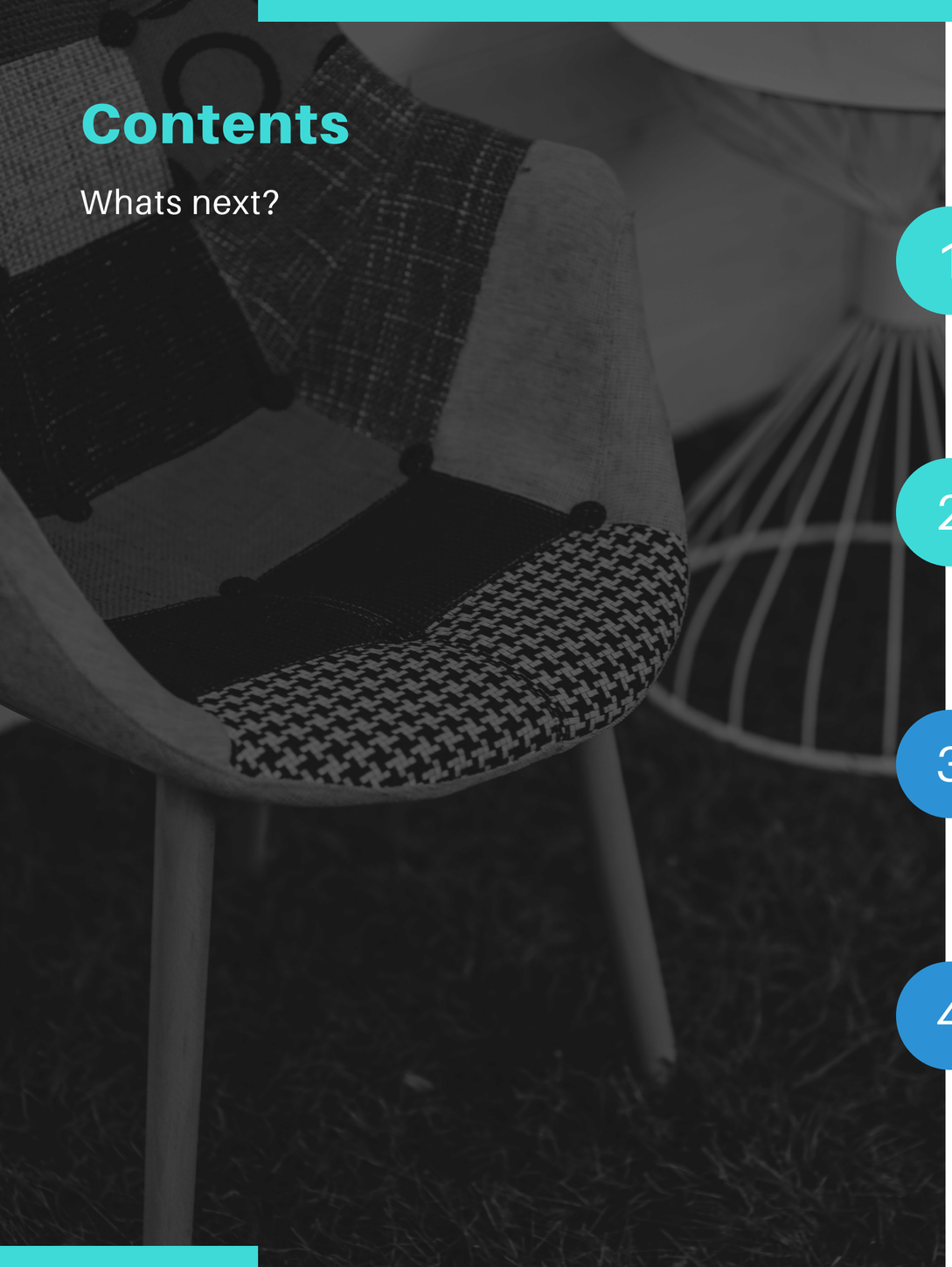
Lets Deploy and test!

For the love of god... Work :)



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Final Notes

- Future of the project: there will be a V2 containing all of the project lottery algorithms and the algorithms are swappable at runtime
- The project repo is here.

Q/A

- Any questions?
- Feel free to contact me at: @sina_shariati

Thanks for your time & attention :)

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