
AWS
re:Invent

BLD207

Hands-off: Automating continuous delivery pipelines at Amazon

Clare Liguori

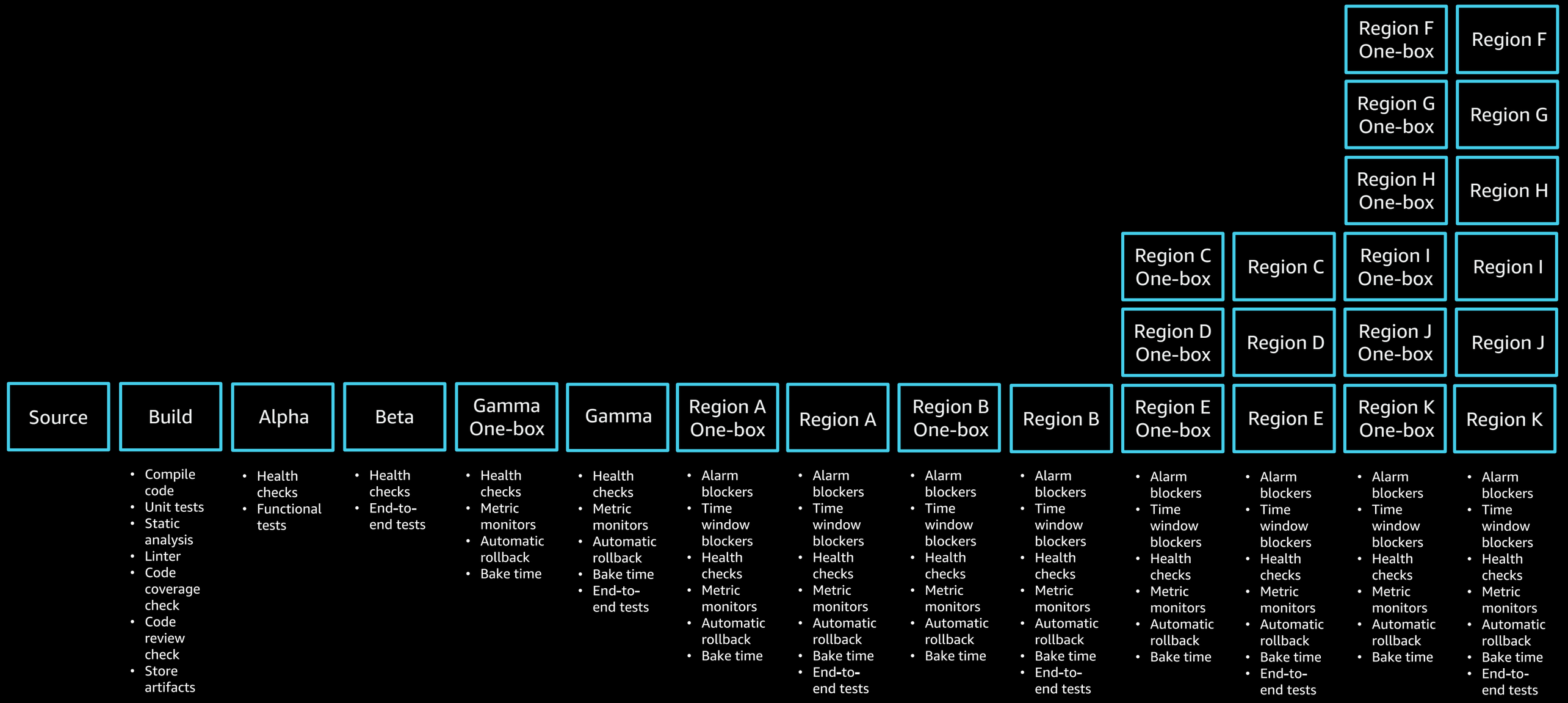
Principal Engineer

Amazon Web Services

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Typical AWS continuous delivery pipeline



Amazon’s approach to hands-off deployments

1. Balance safety and speed of deployments
2. Roll back deployments automatically
3. Automate pre-production testing



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Balance safety and speed of deployments



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Balancing safety and speed

Deploy to production	As fast as possible	As slowly as possible
Risk of impacting many customers		
Speed of delivering changes to customers		

Balancing safety and speed

Deploy to production	As fast as possible	As slowly as possible
Risk of impacting many customers	High ☹	
Speed of delivering changes to customers	Fast ☺	

Balancing safety and speed

Deploy to production	As fast as possible	As slowly as possible
Risk of impacting many customers	High ☹	Low ☺
Speed of delivering changes to customers	Fast ☺	Slow ☹

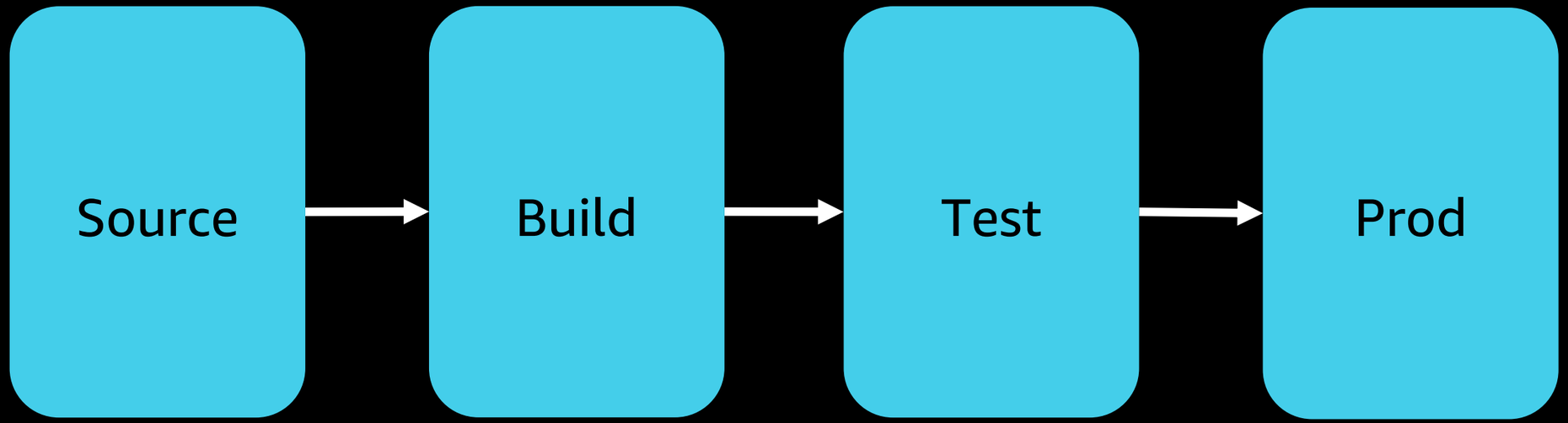
Balance safety and speed:

Deploy small at first, then more broadly.

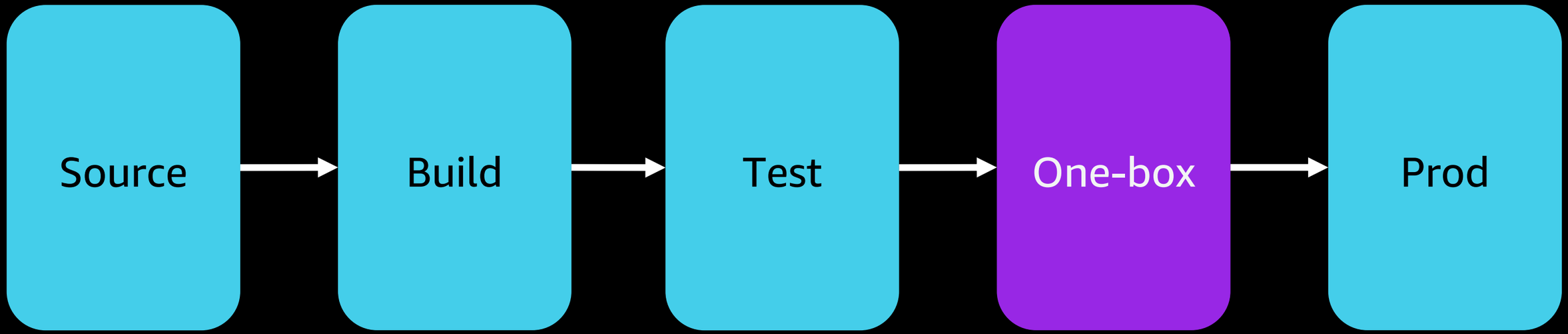


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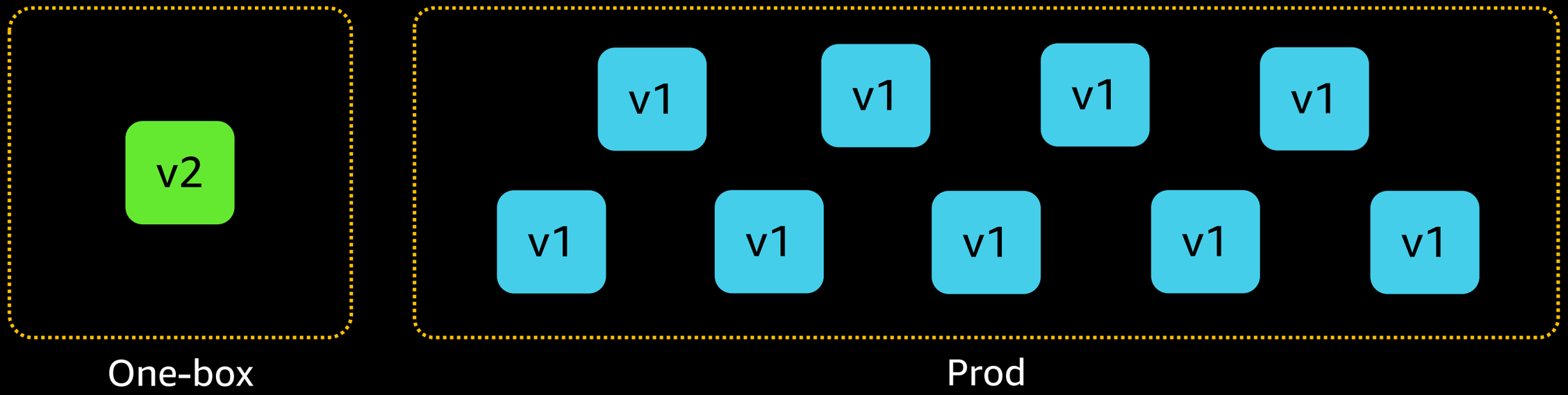
Individual microservice pipelines



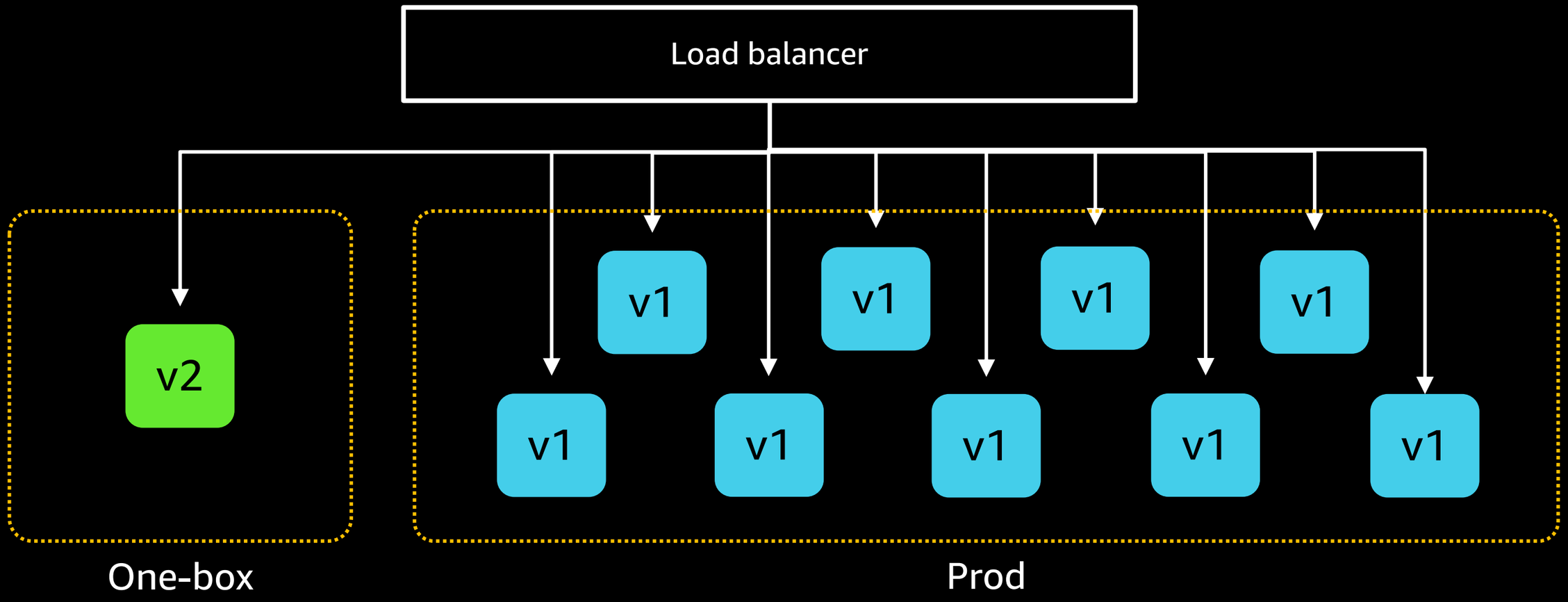
One-box deployments



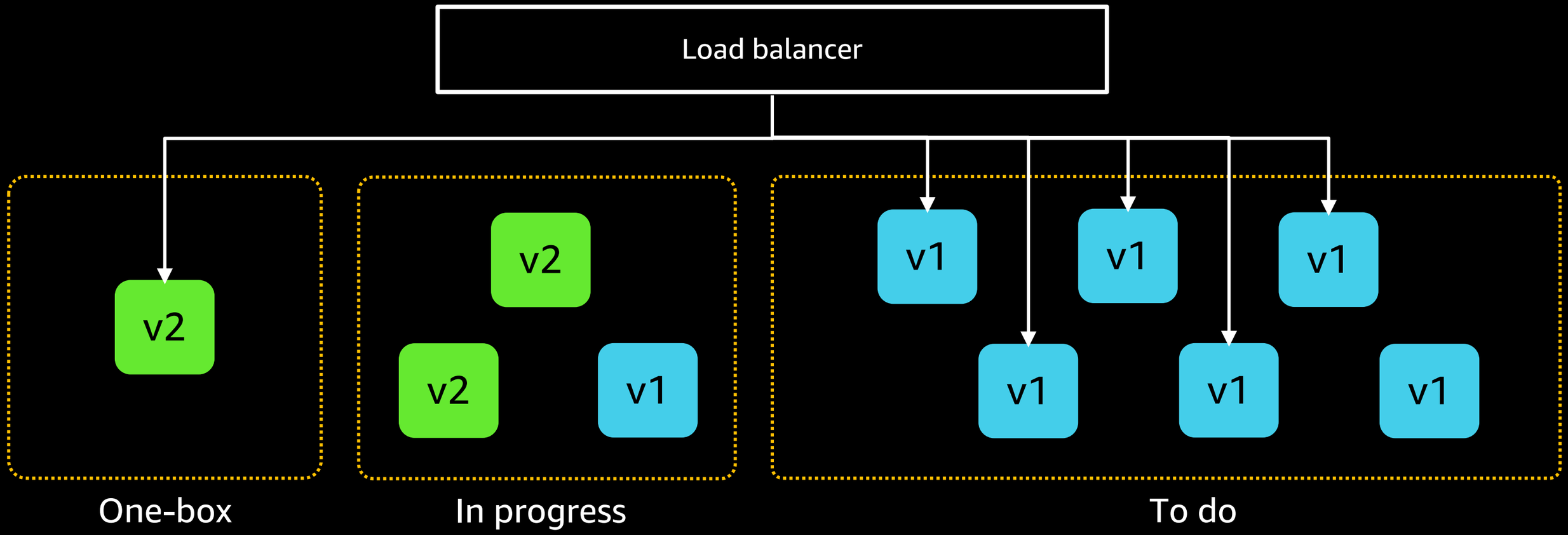
One-box deployments



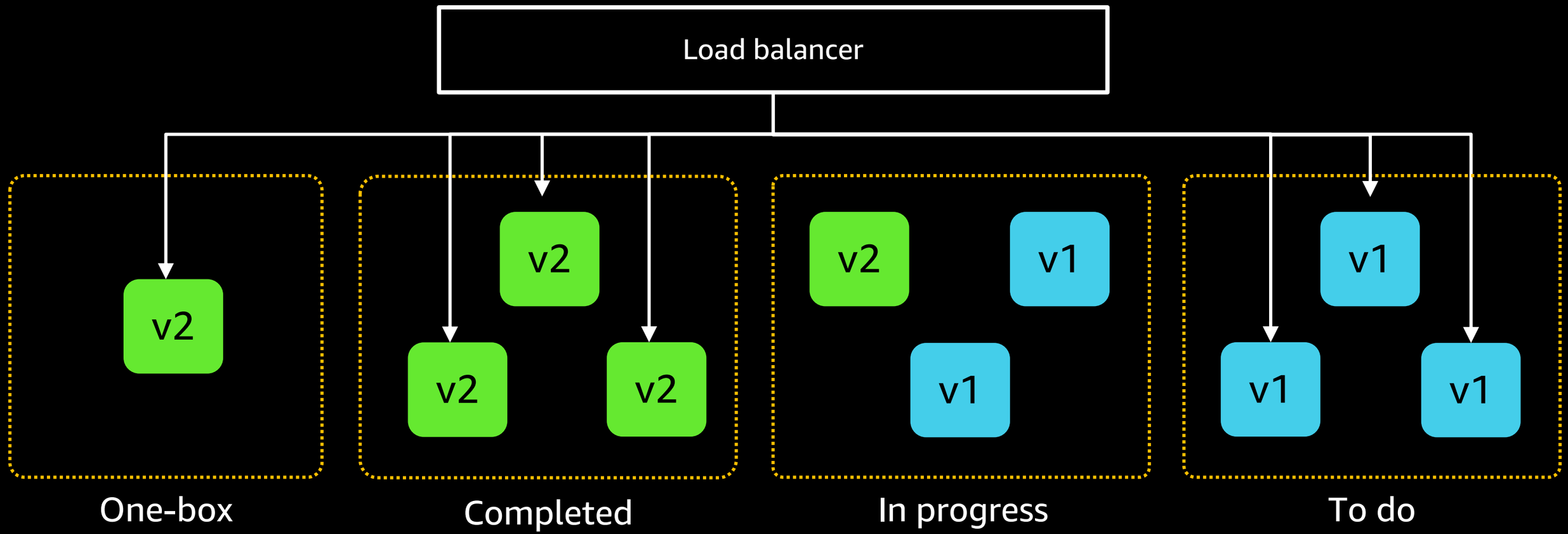
One-box deployments



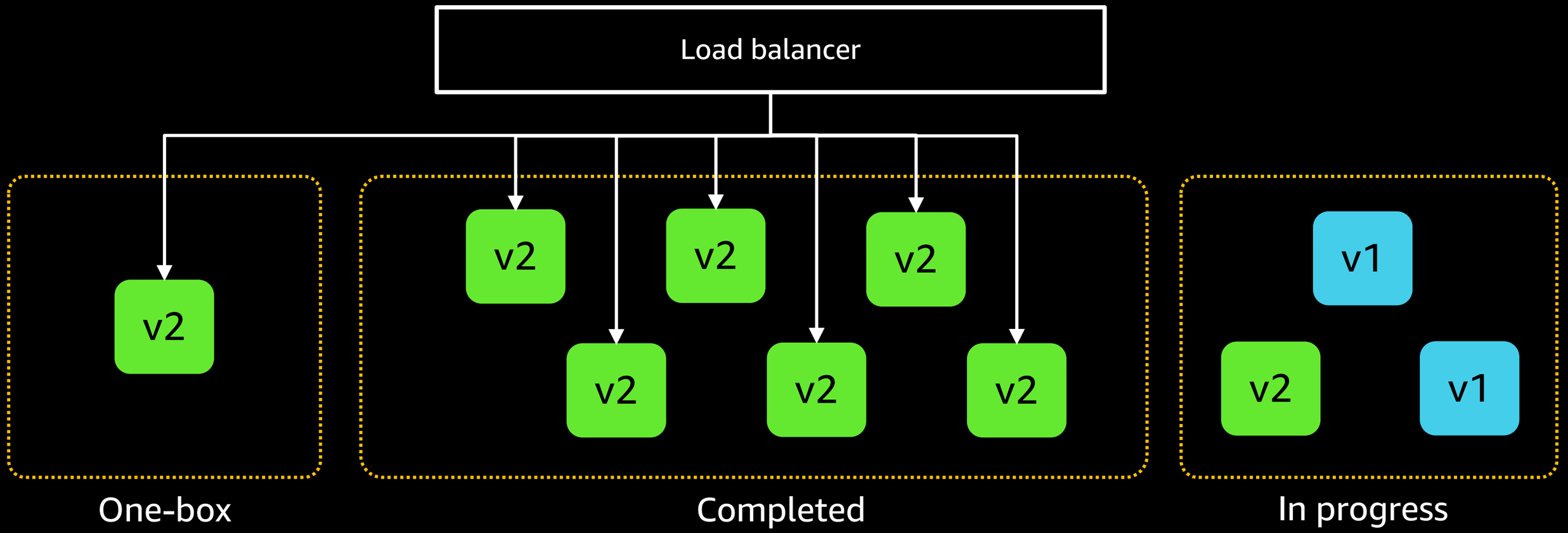
Rolling deployments



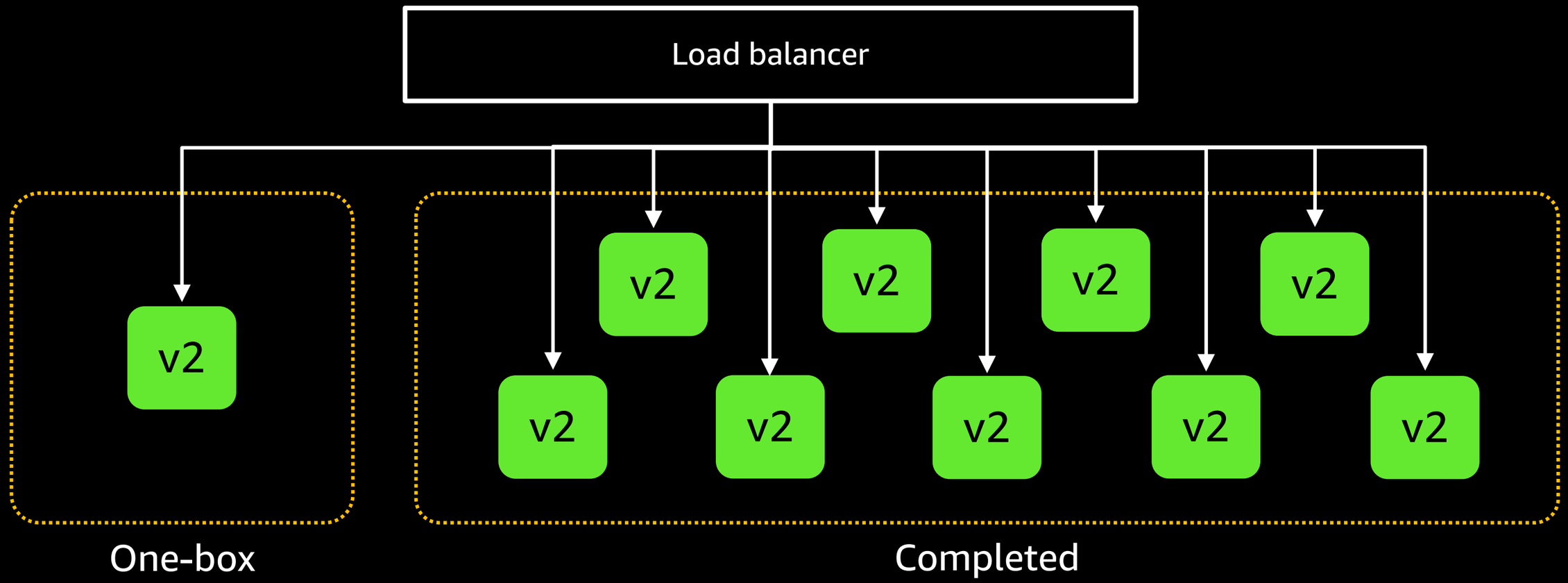
Rolling deployments



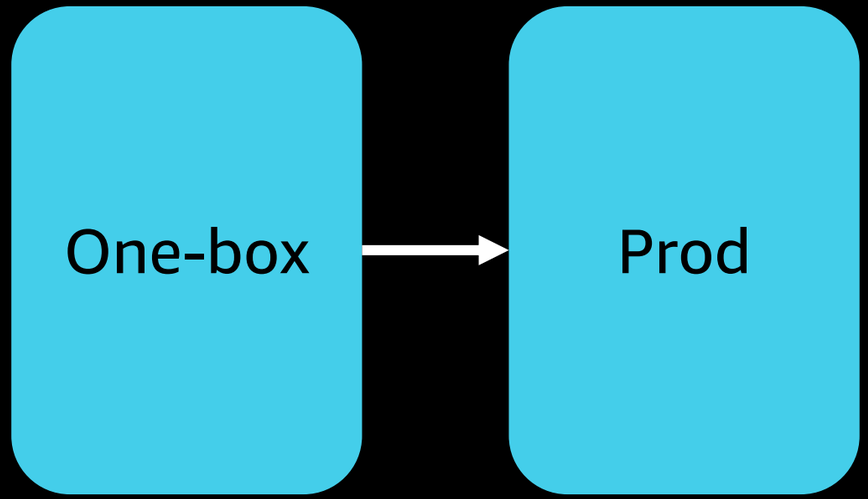
Rolling deployments



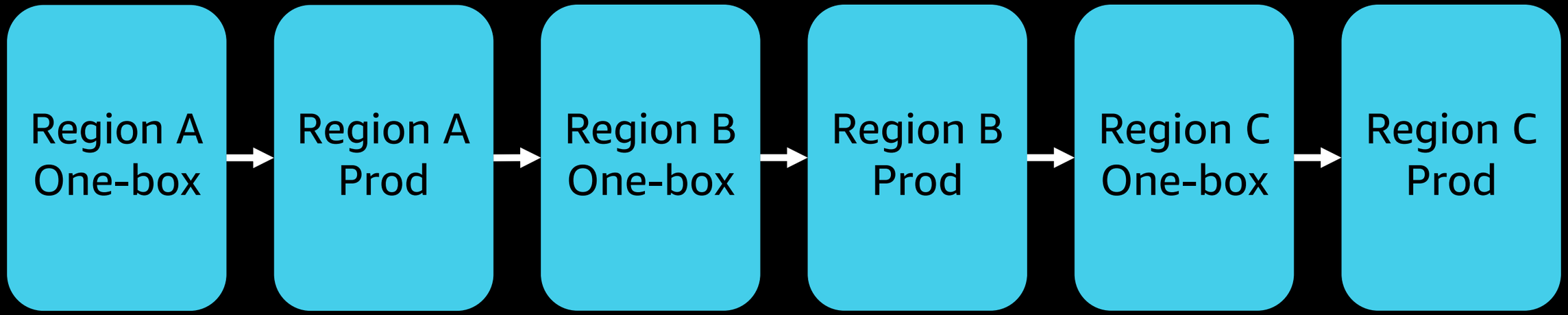
Rolling deployments



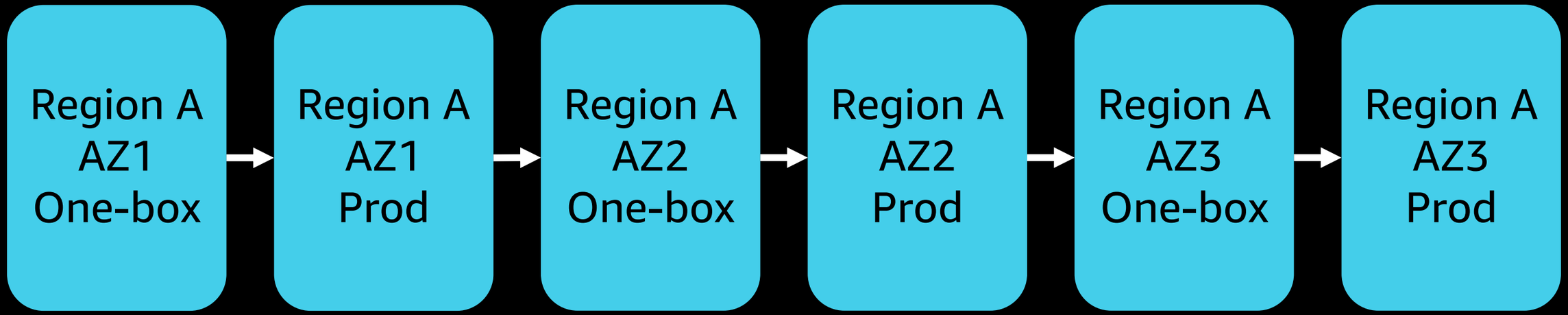
Regional deployments



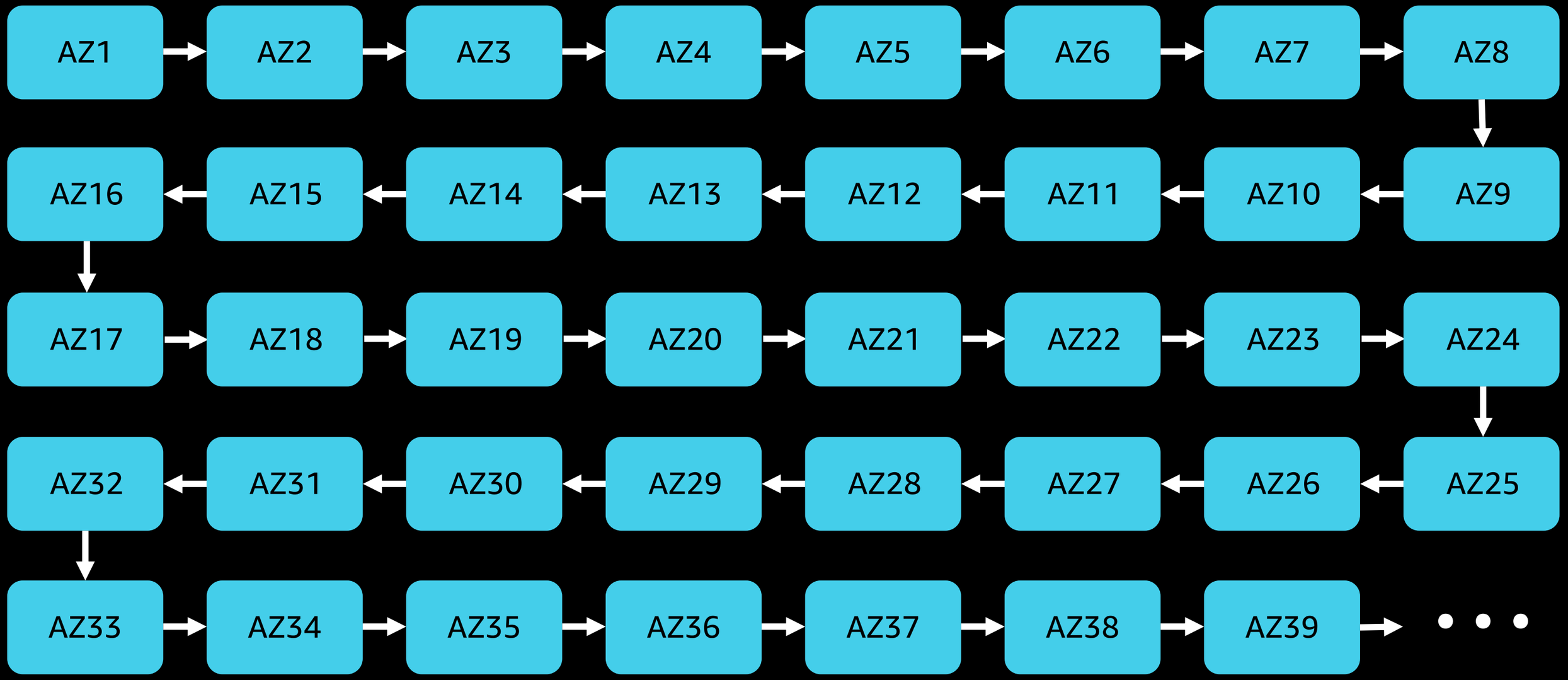
Regional deployments



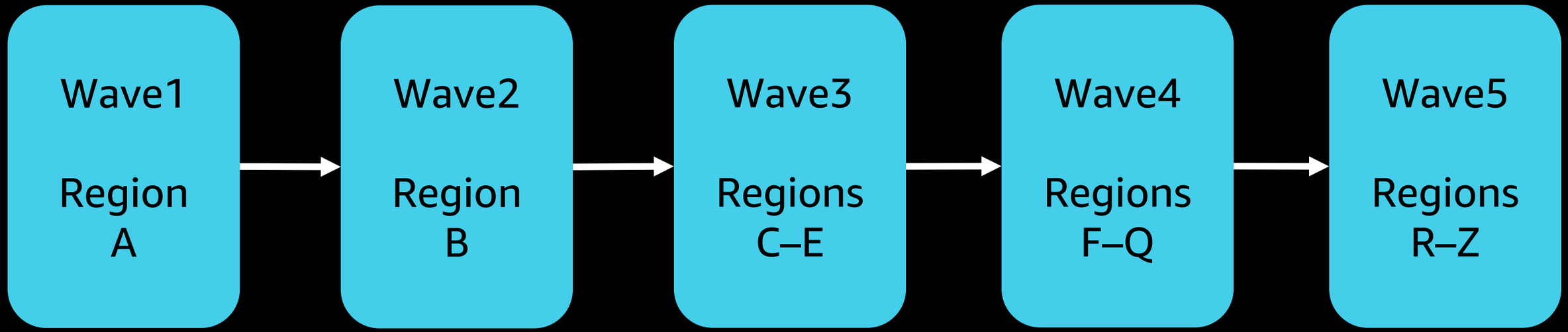
Zonal deployments



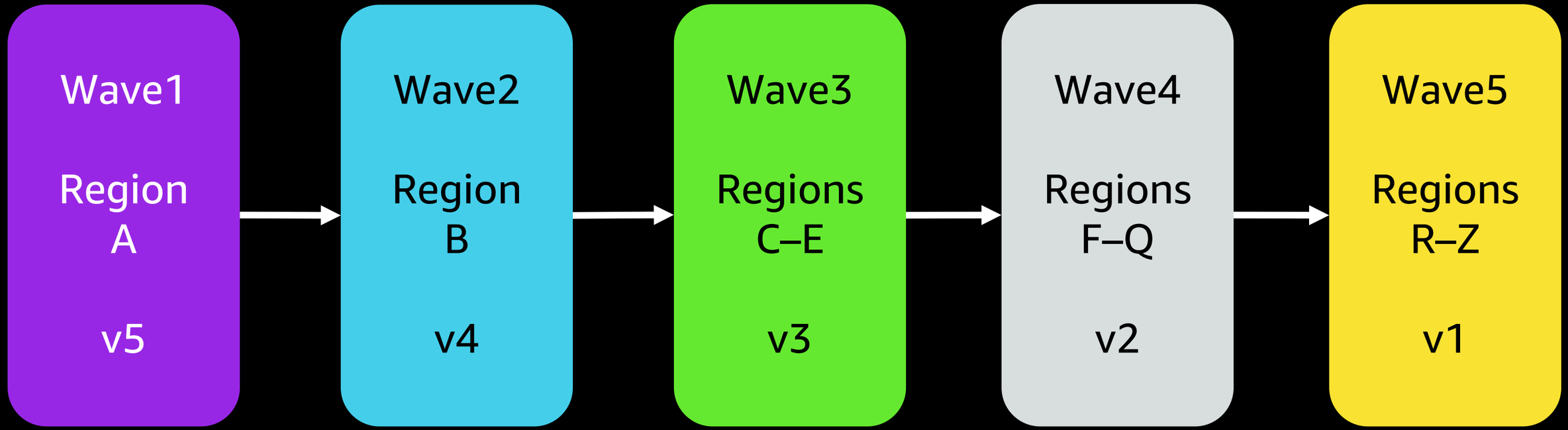
Zonal deployments



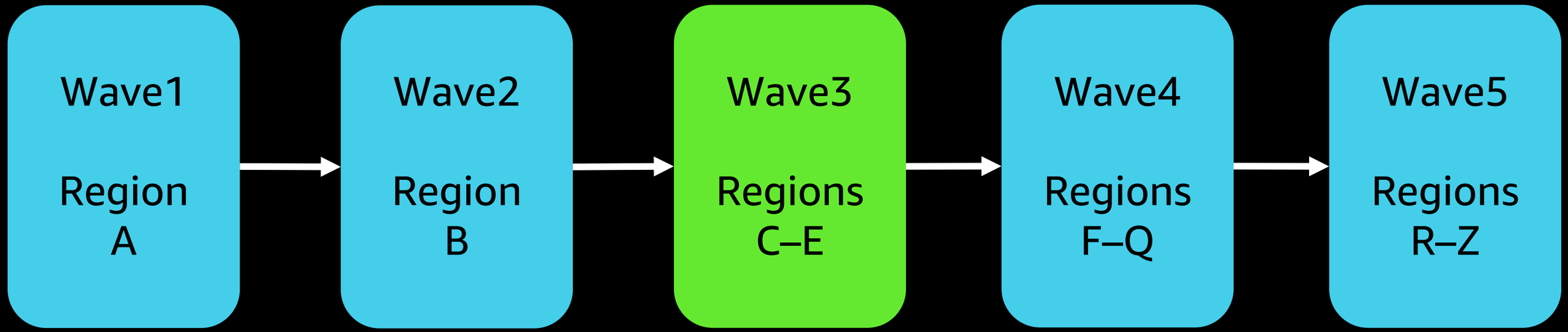
Deployment waves



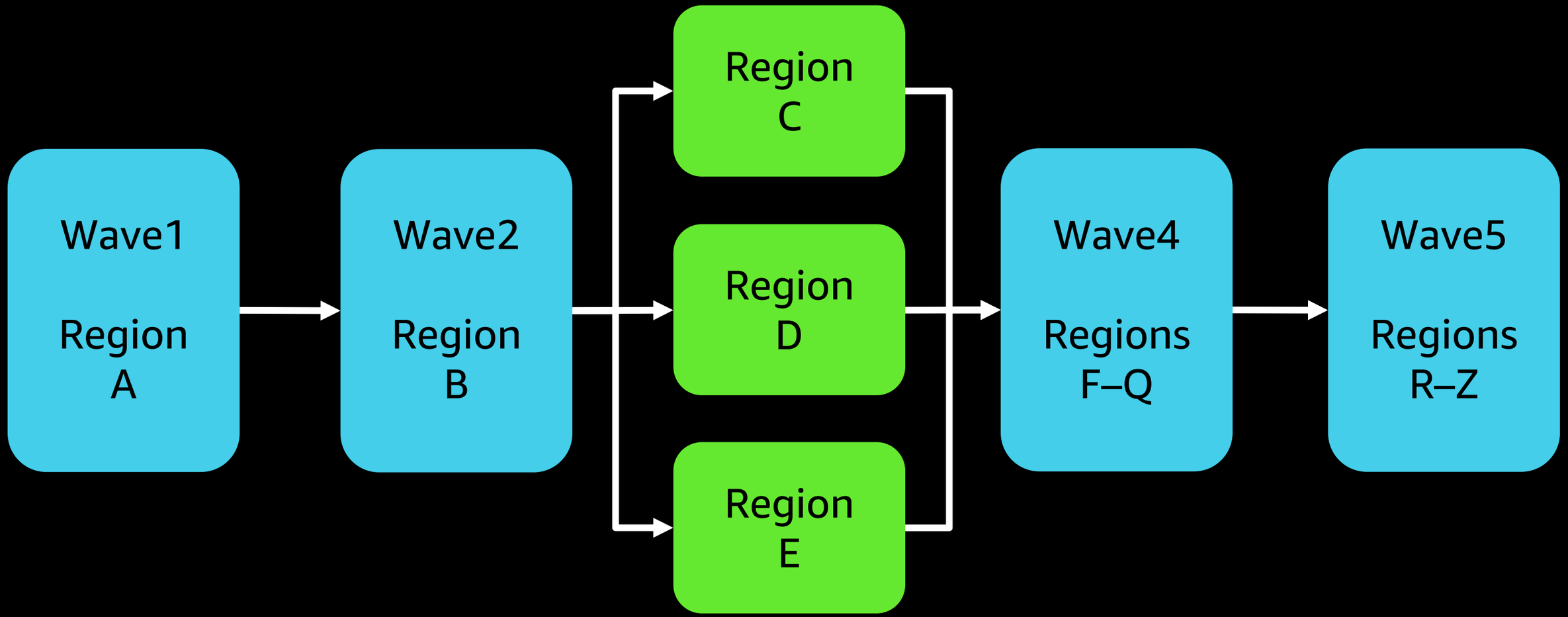
Deployment waves



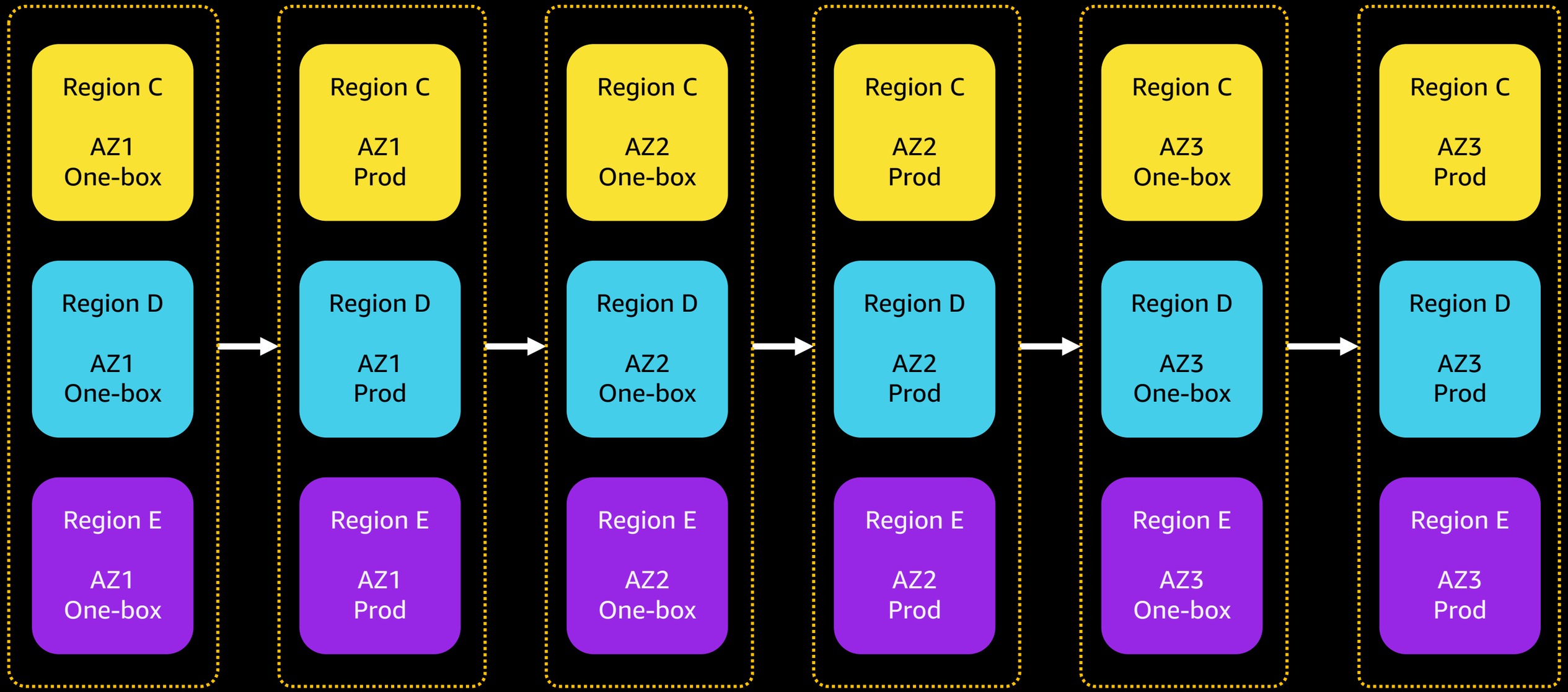
Deployment waves



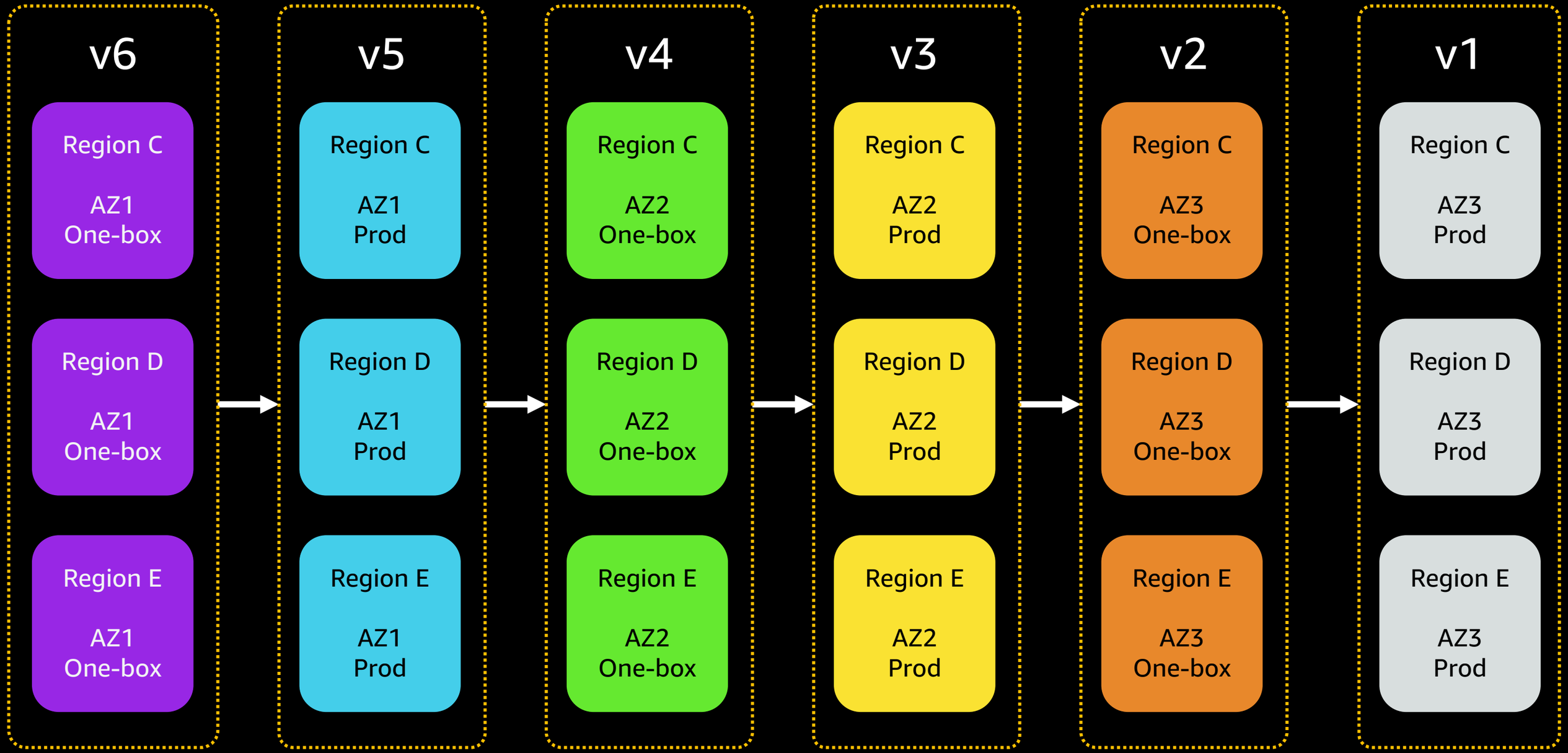
Deployment waves



Deployment waves



Deployment waves



Balancing safety and speed

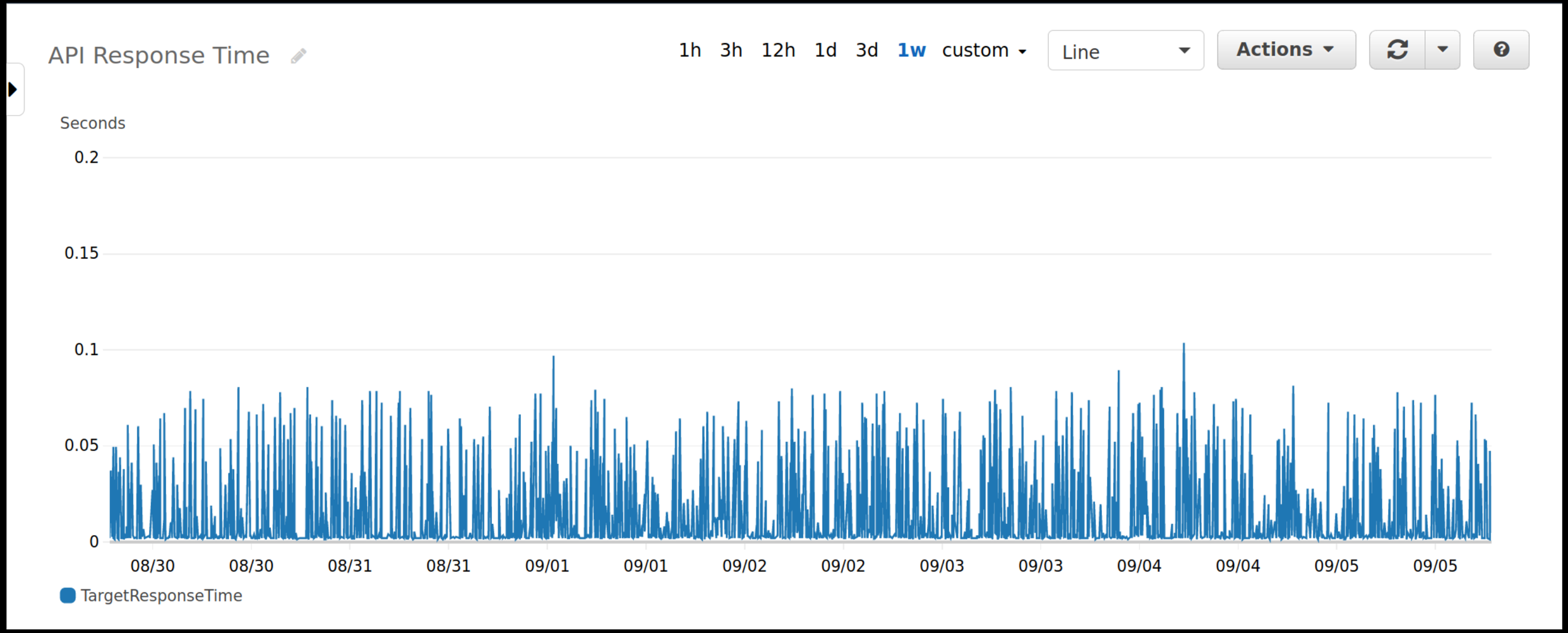
1. Individual microservice pipelines
2. One-box deployments
3. Rolling deployments
4. Regional deployments
5. Zonal deployments
6. Deployment waves

Roll back automatically



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Rollback metrics monitoring



Roll back automatically:

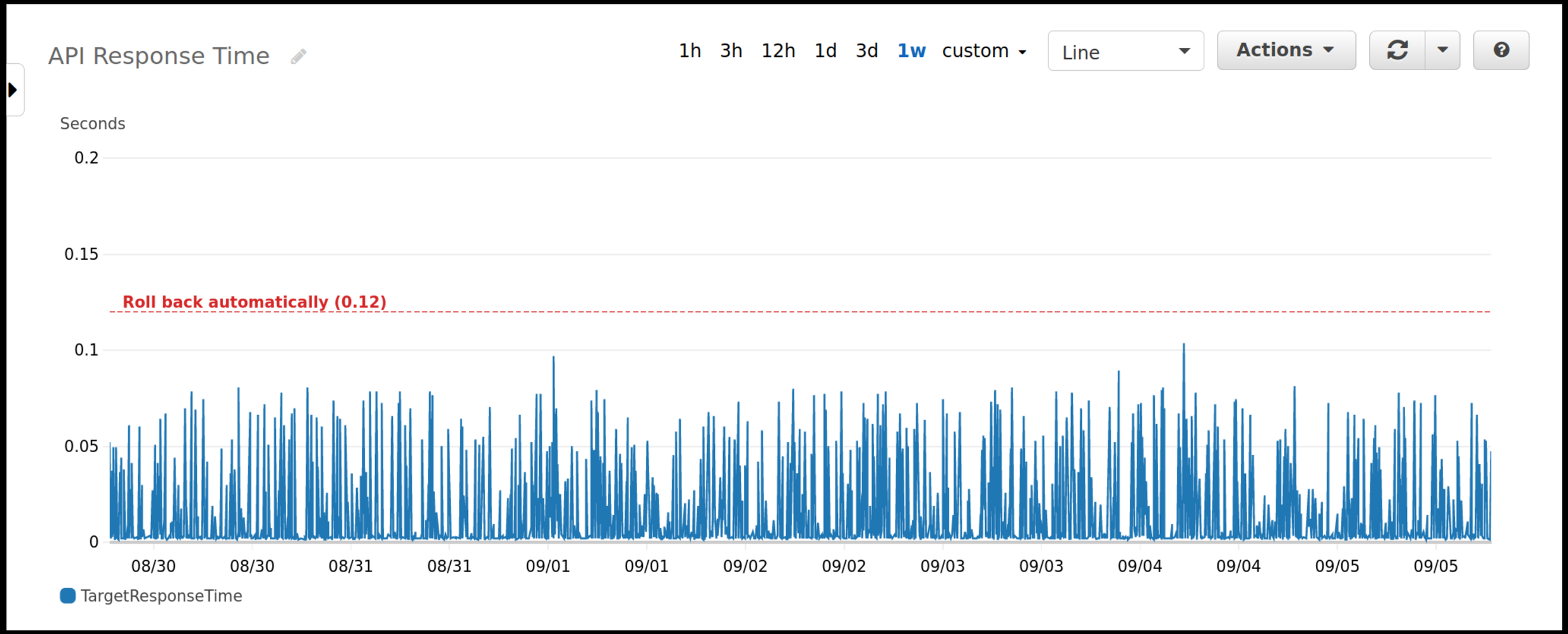
Let the pipeline watch the metrics so that developers don’t have to.



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Auto-rollback metrics monitoring



Auto-rollback metrics monitoring

- P50 latency
- P90 latency
- P99 latency
- API faults (HTTP 500 responses)
- API errors (HTTP 400 responses)
- Failing health checks
- Errors in logs
- CPU usage
- Memory usage
- Disk usage

Auto-rollback metrics monitoring

- Regional P50 latency
- Regional P90 latency
- Regional P99 latency
- Regional API faults (HTTP 500 responses)
- Regional API errors (HTTP 400 responses)
- Regional failing health checks
- Regional errors in logs
- Regional CPU usage
- Regional memory usage
- Regional disk usage

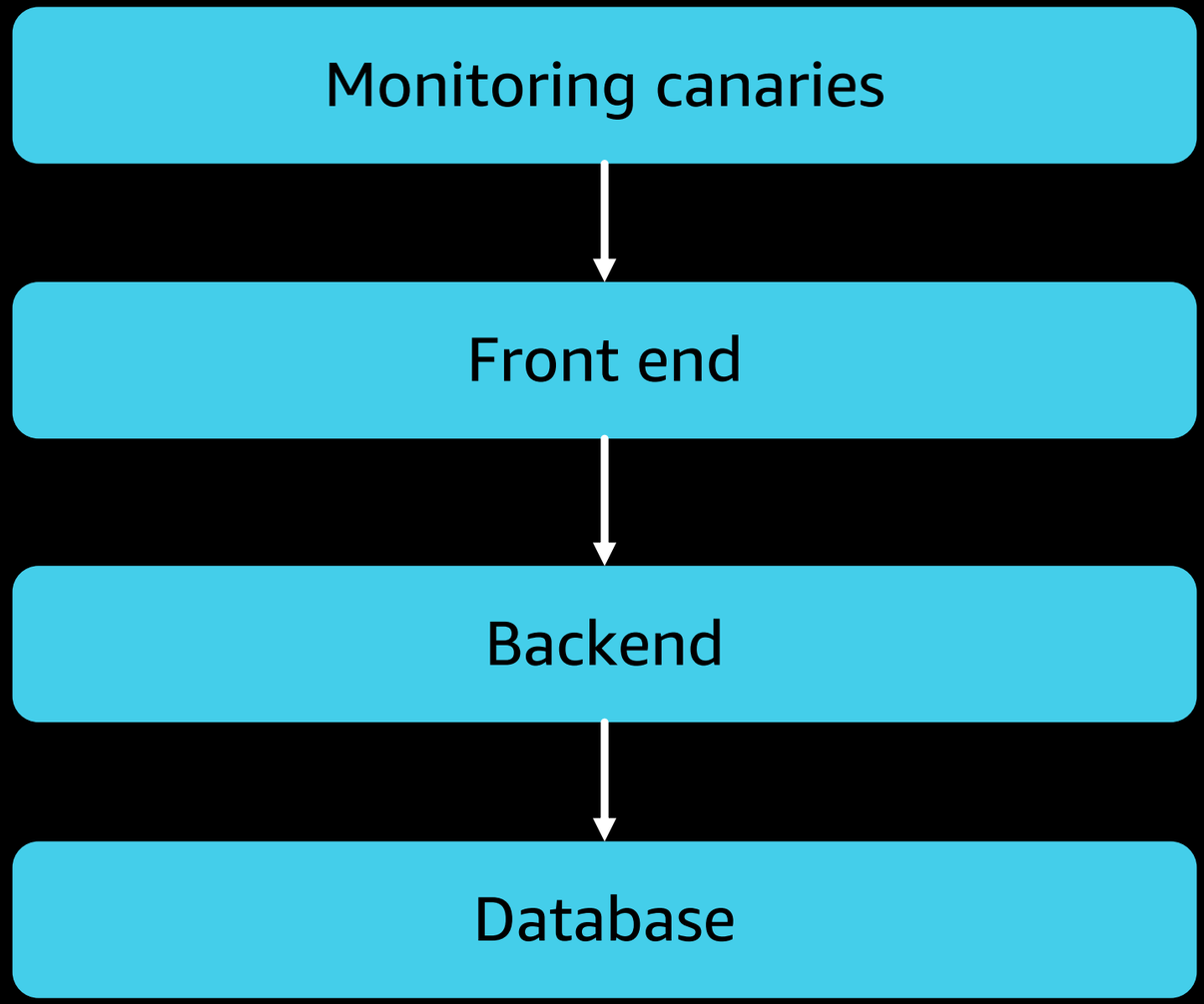
Auto-rollback metrics monitoring

- Zonal P50 latency
- Zonal P90 latency
- Zonal P99 latency
- Zonal API faults (HTTP 500 responses)
- Zonal API errors (HTTP 400 responses)
- Zonal failing health checks
- Zonal errors in logs
- Zonal CPU usage
- Zonal memory usage
- Zonal disk usage

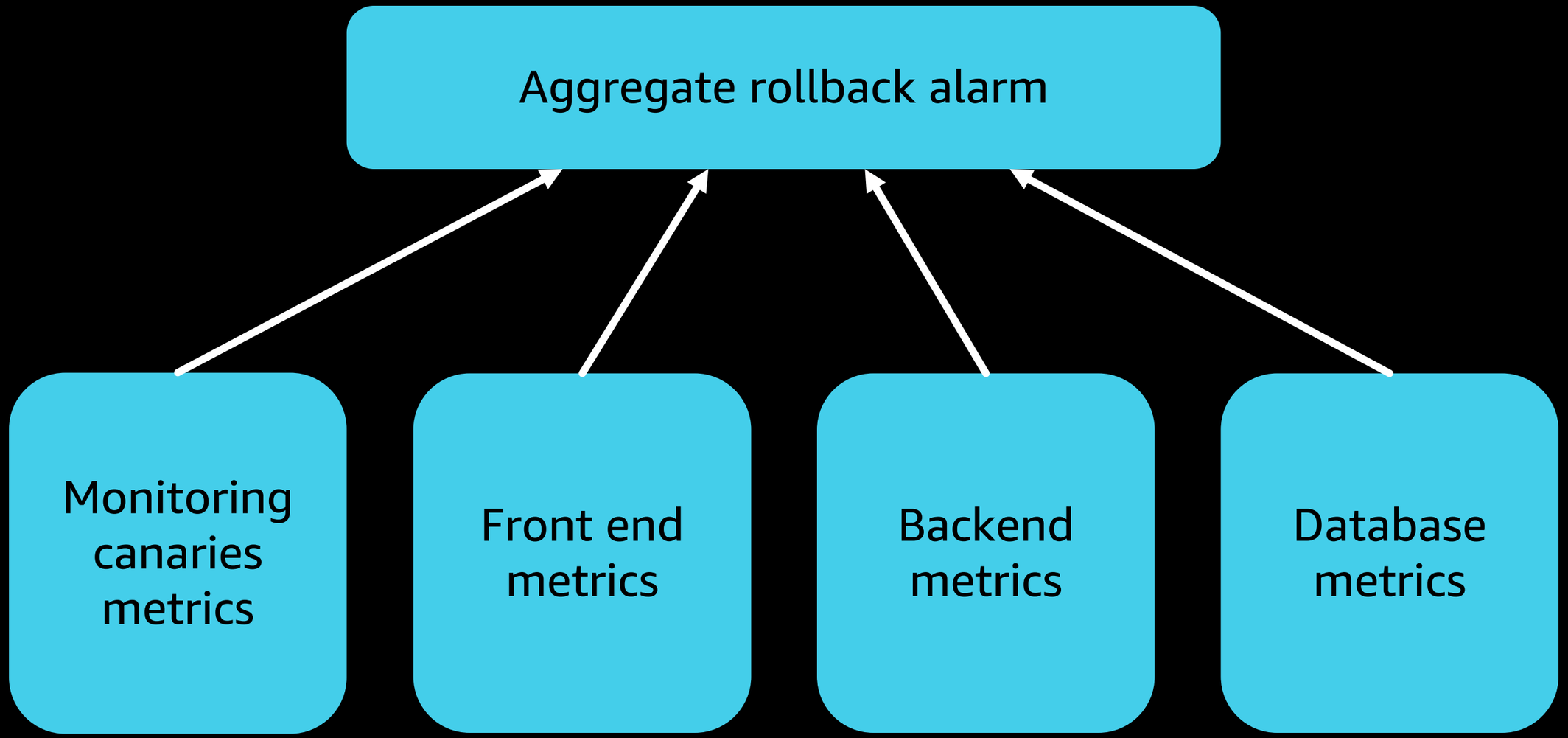
Auto-rollback metrics monitoring

- One-box P50 latency
- One-box P90 latency
- One-box P99 latency
- One-box API faults (HTTP 500 responses)
- One-box API errors (HTTP 400 responses)
- One-box failing health checks
- One-box errors in logs
- One-box CPU usage
- One-box memory usage
- One-box disk usage

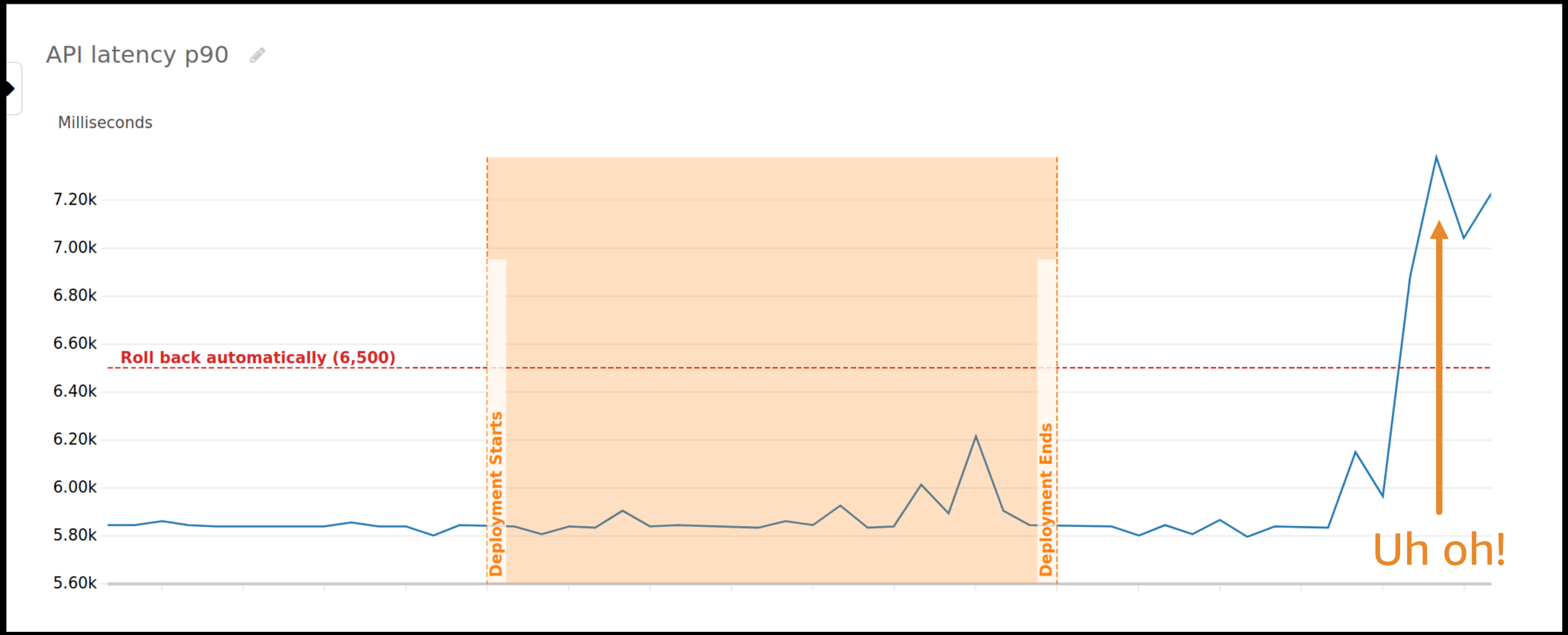
Auto-rollback metrics monitoring



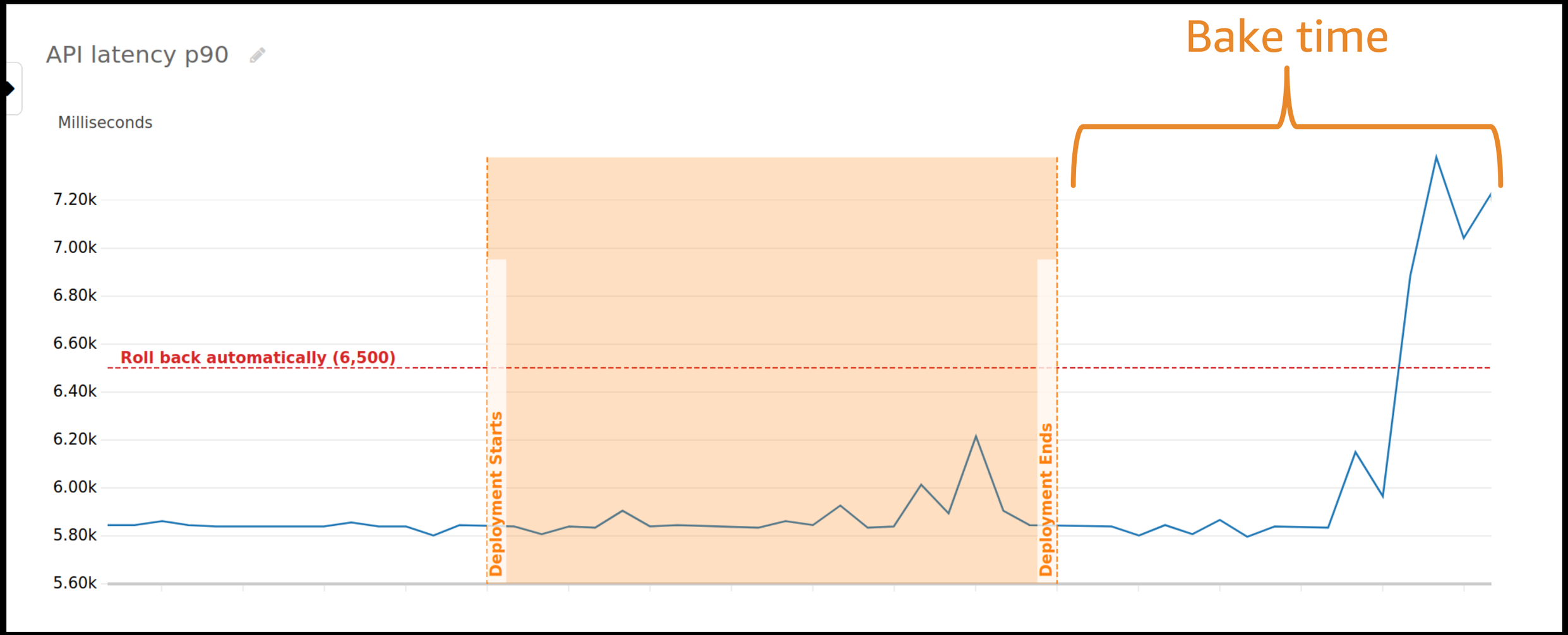
Auto-rollback metrics monitoring



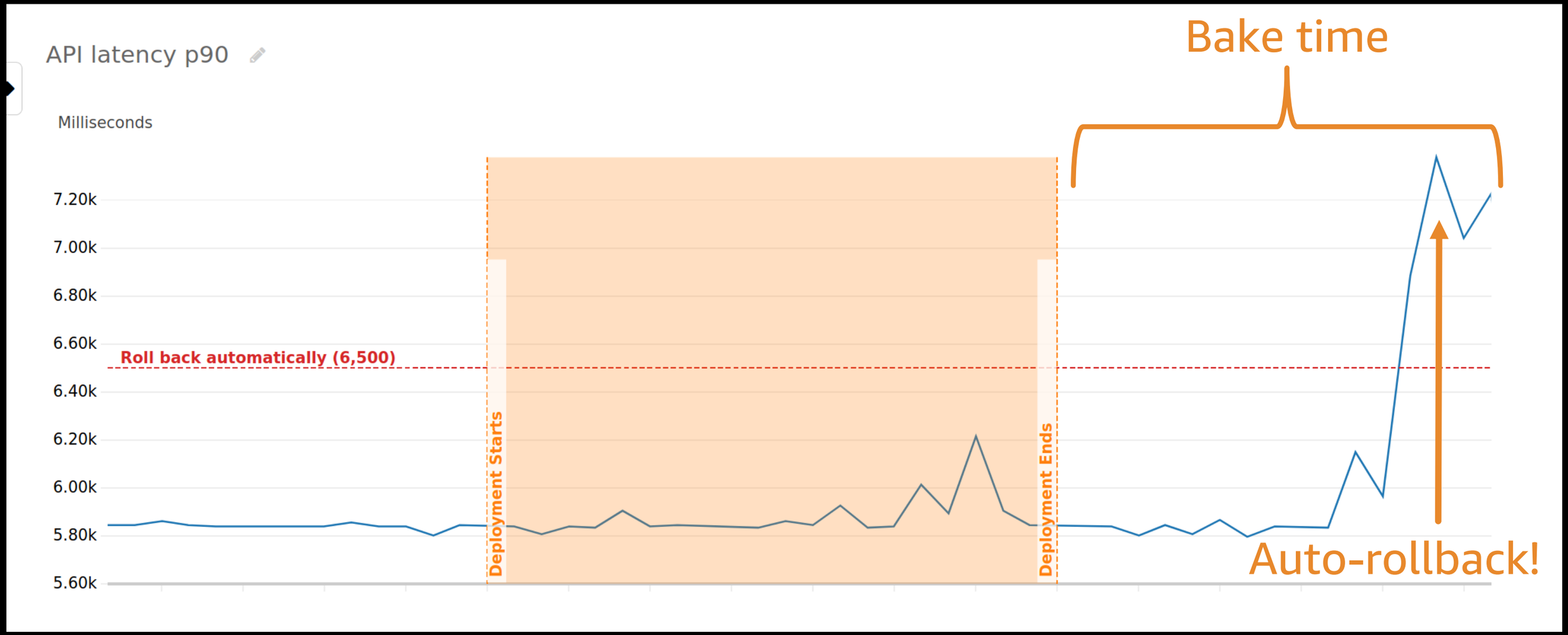
Auto-rollback bake time



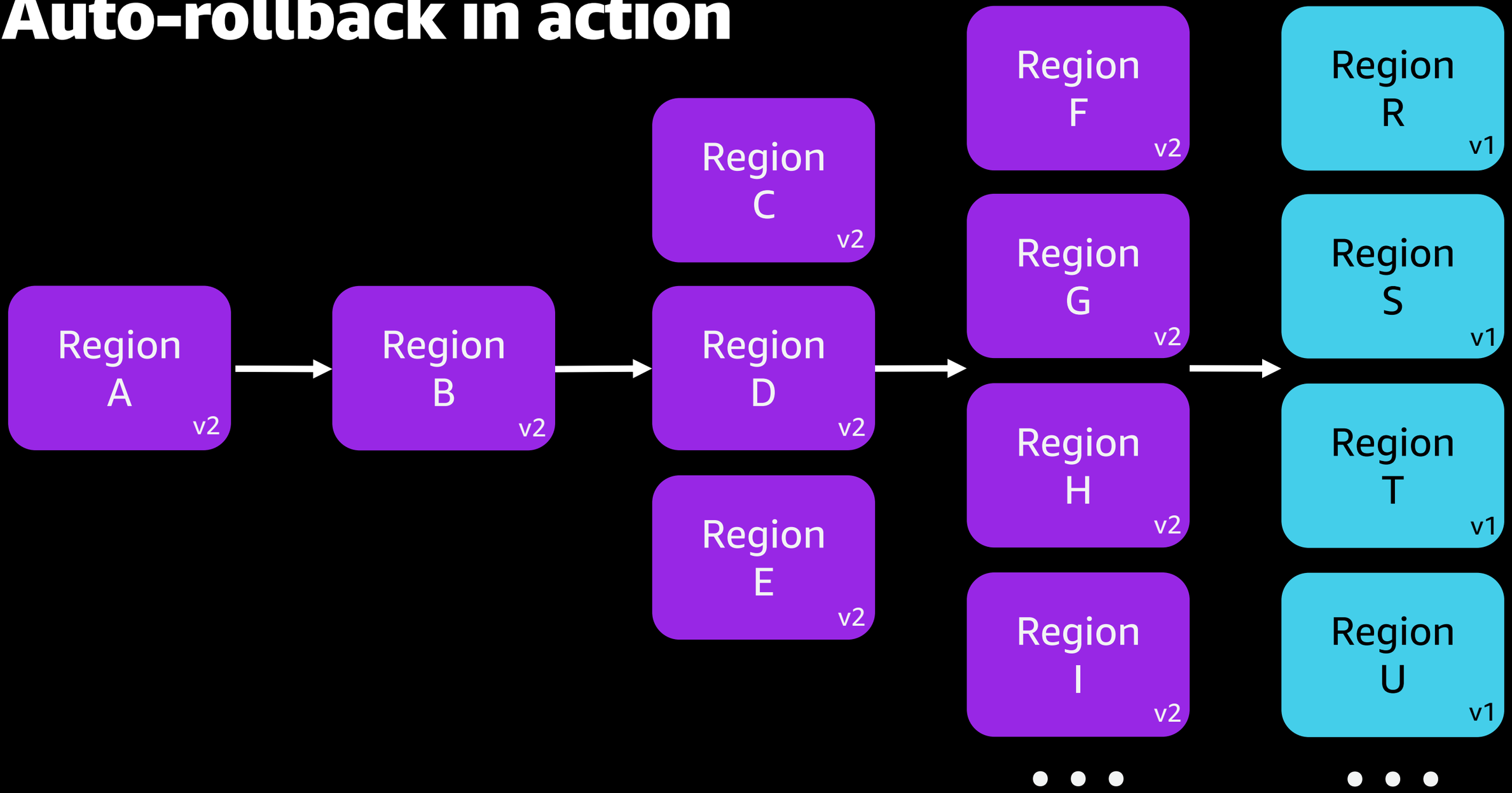
Auto-rollback bake time



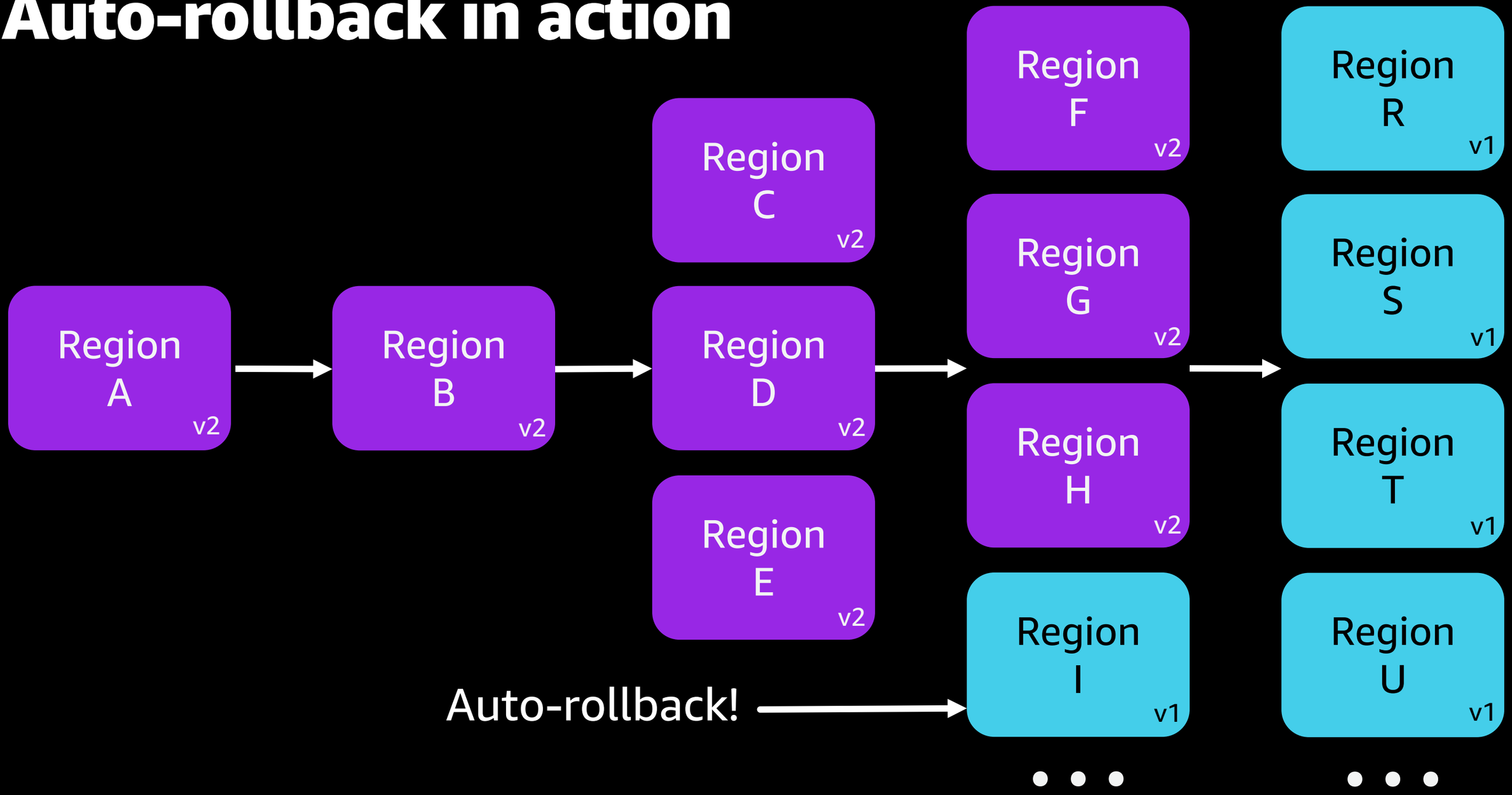
Auto-rollback bake time



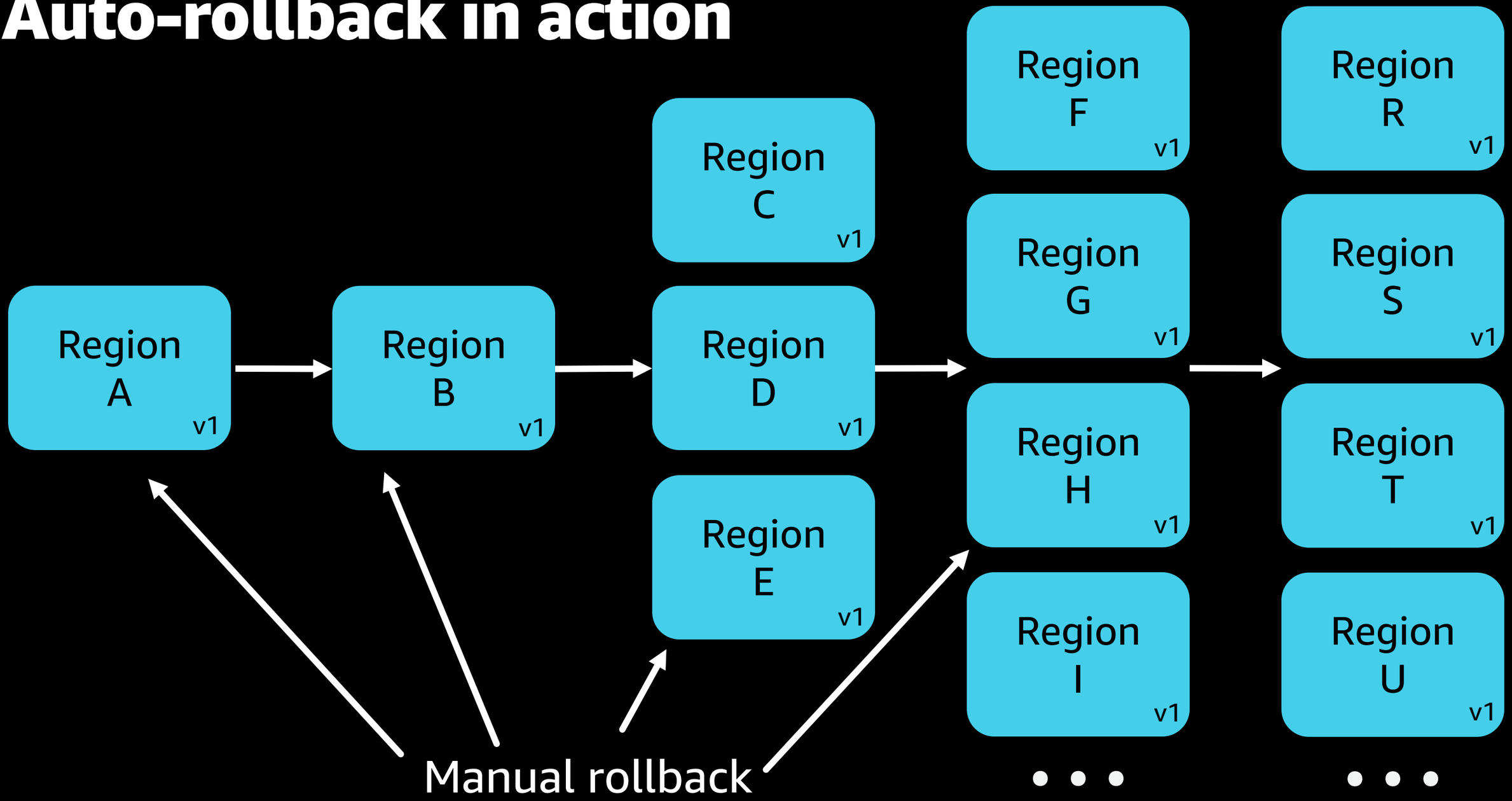
Auto-rollback in action



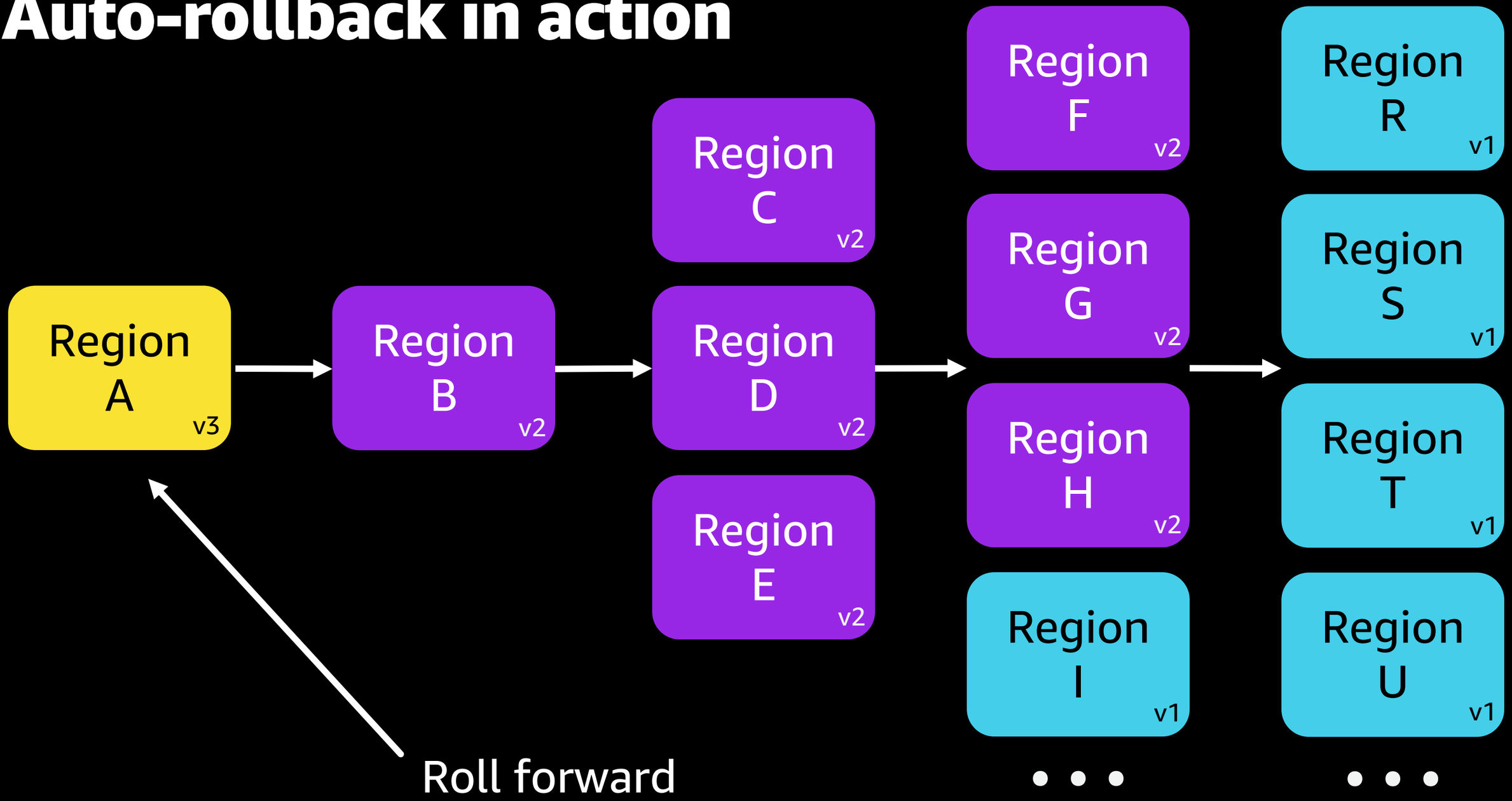
Auto-rollback in action



Auto-rollback in action



Auto-rollback in action



Design changes for auto-rollback

1. Make changes backward-compatible where possible
2. Break up a backward-incompatible change into a two-phase deployment

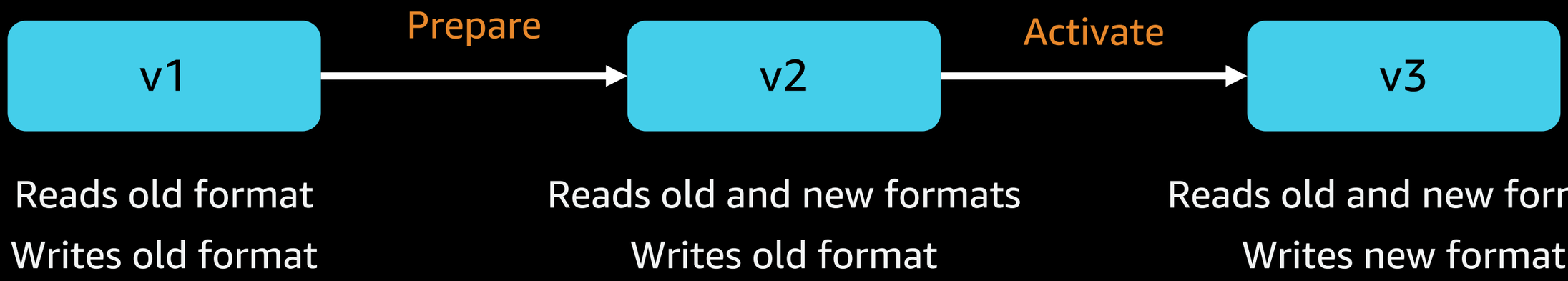
```
structure CreateSessionInput
{
    @required
    id: String,

    @required
    description: String,

    // this new field is
    // not required, and has
    // a default value
    sessionType: SessionType,
}
```

Two-phase deployments

1. Prepare: Deploy code that reads the new format and the old format
2. Activate: Deploy code that writes the new format
3. (Optional) Cleanup: Deploy code to stop reading the old format



Roll back automatically

1. Automatically roll back on metric-based alarms
2. Let deployments bake
3. Design new changes for automatic rollback

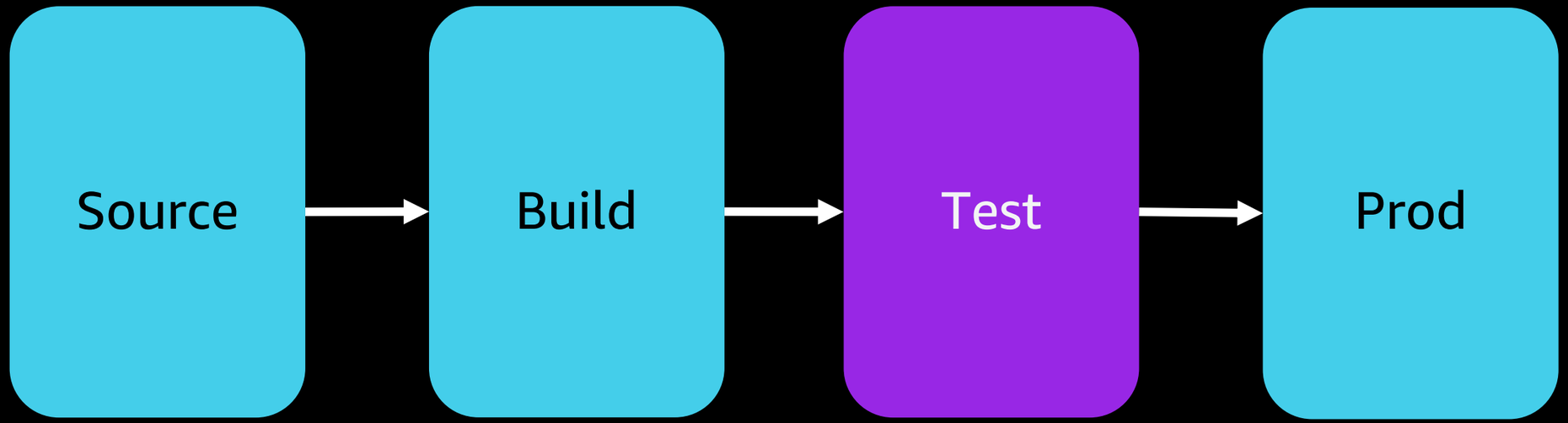
Automate pre-production testing



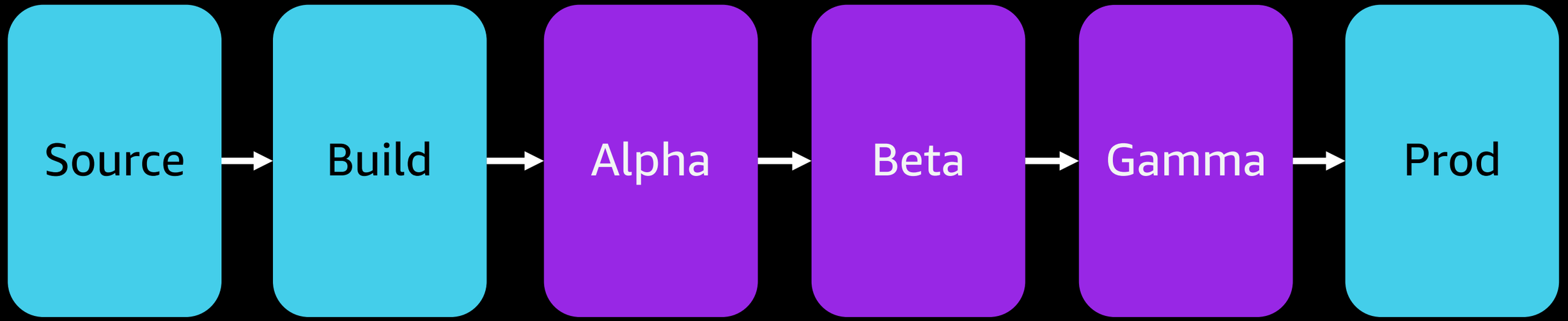
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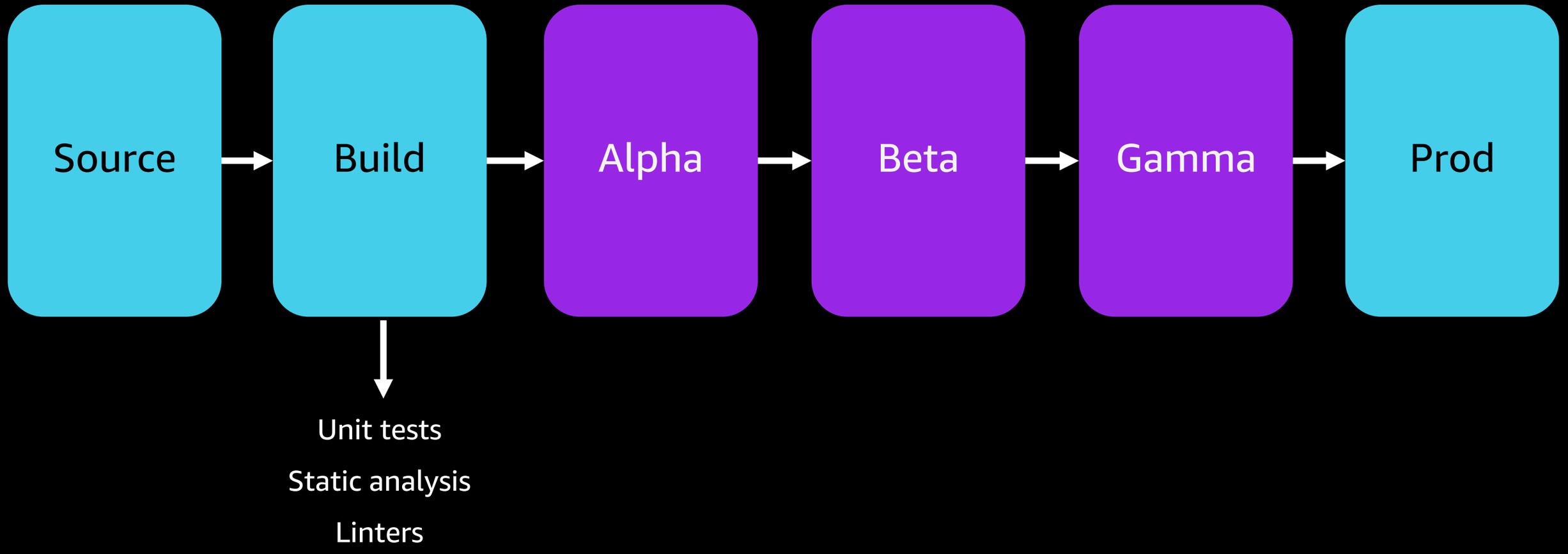
Pre-production environments



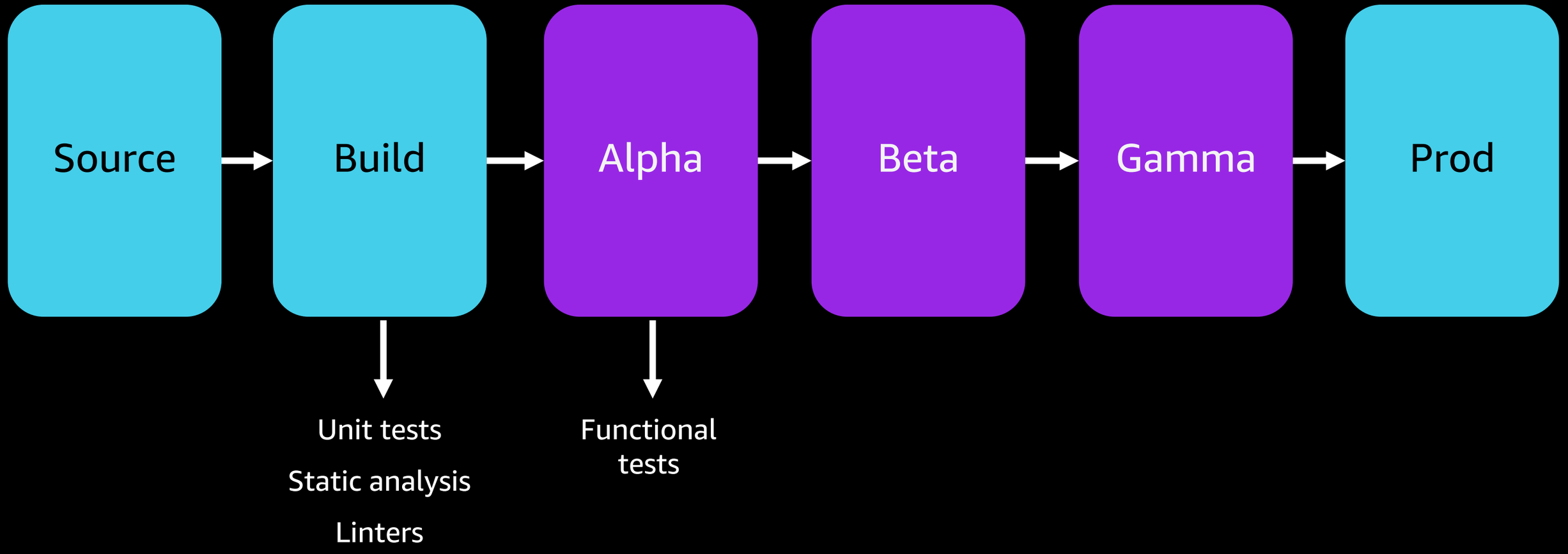
Pre-production environments



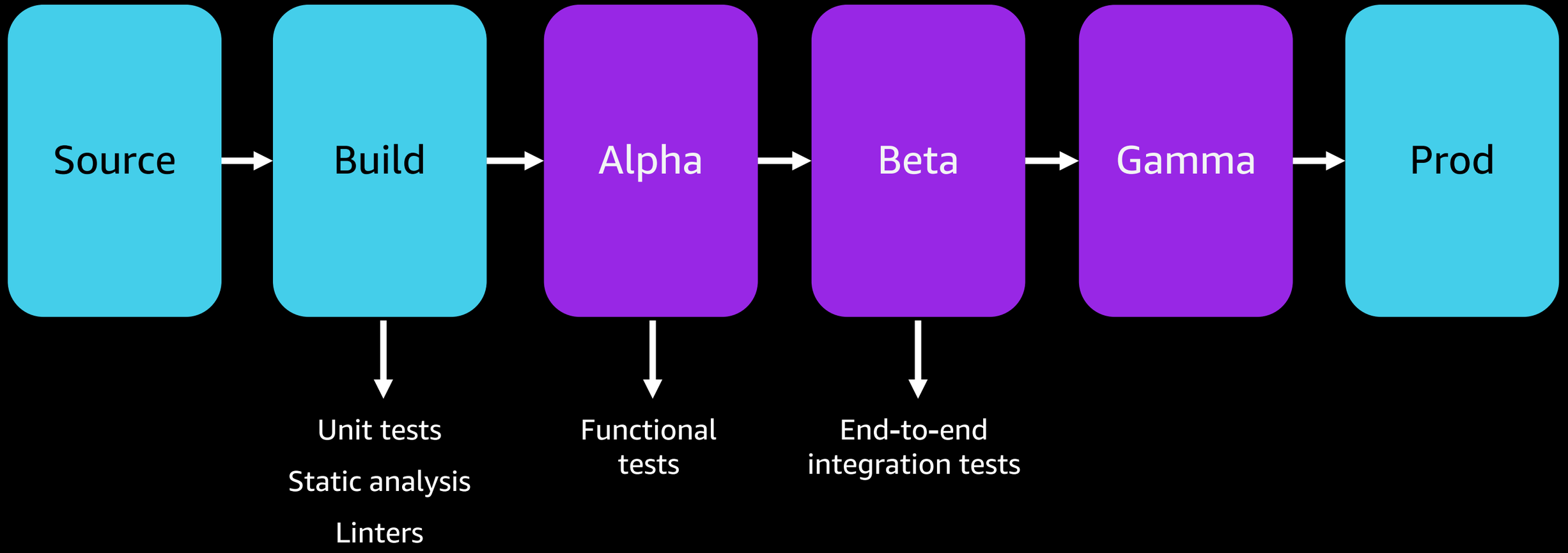
Pre-production environments



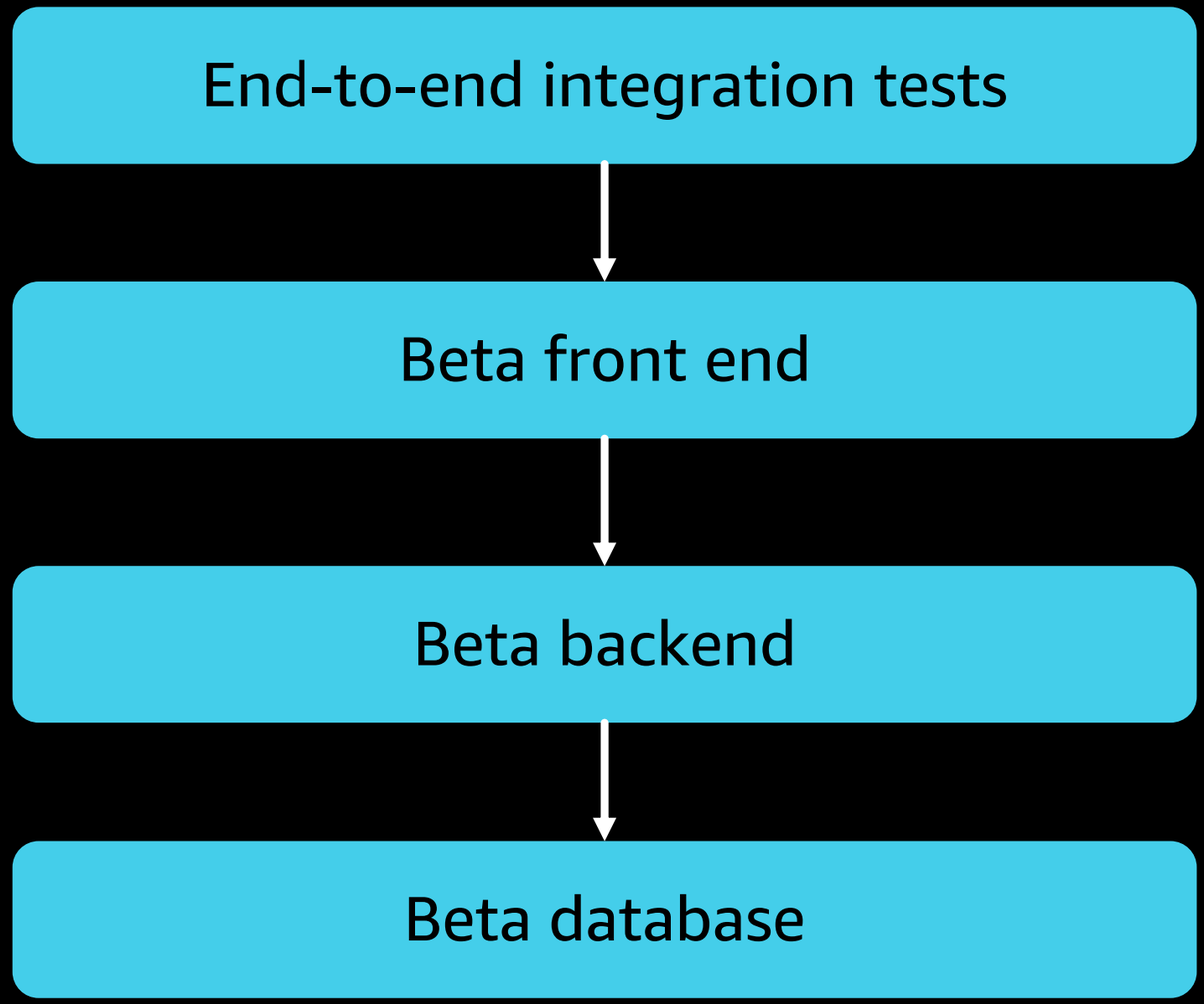
Pre-production environments



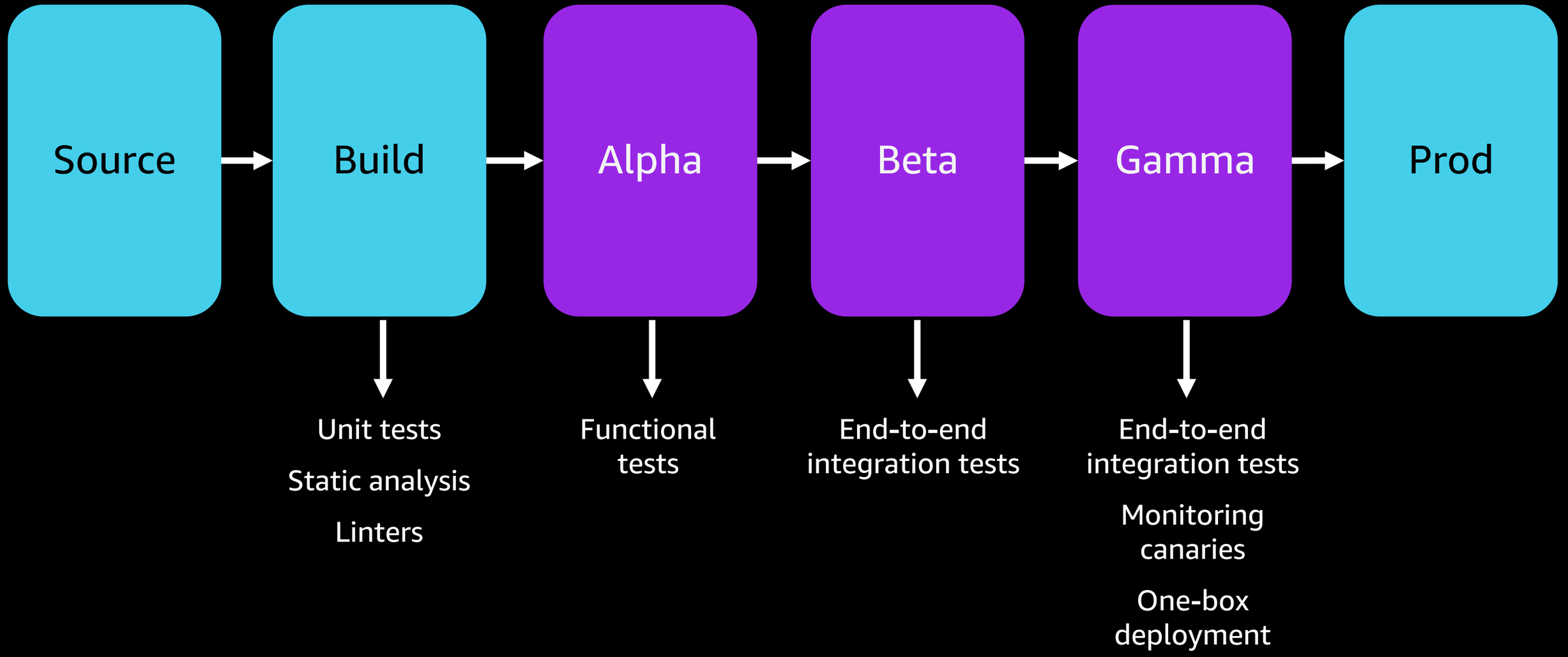
Pre-production environments



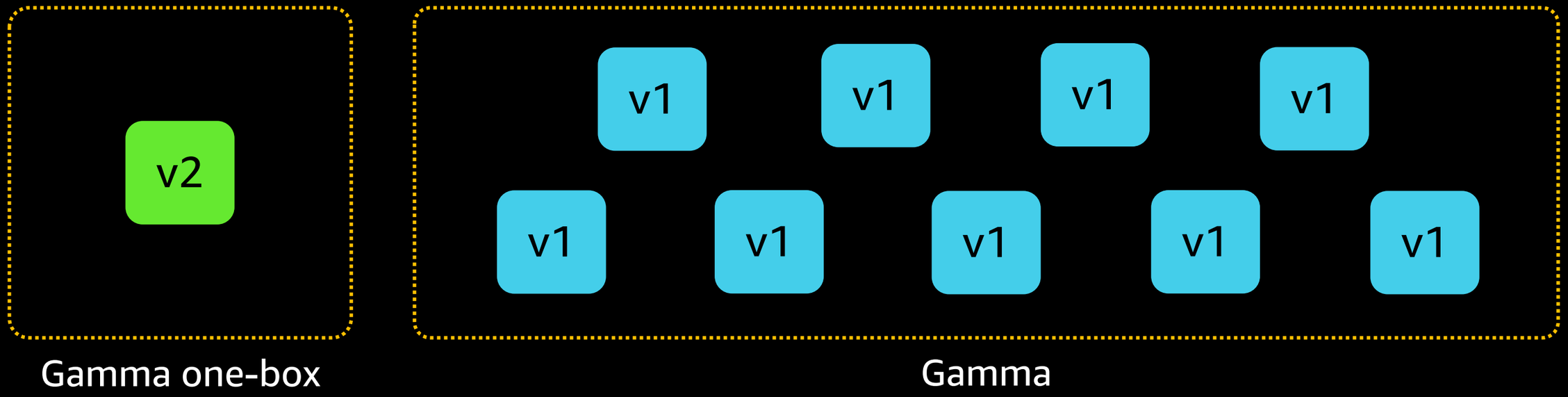
End-to-end integration tests



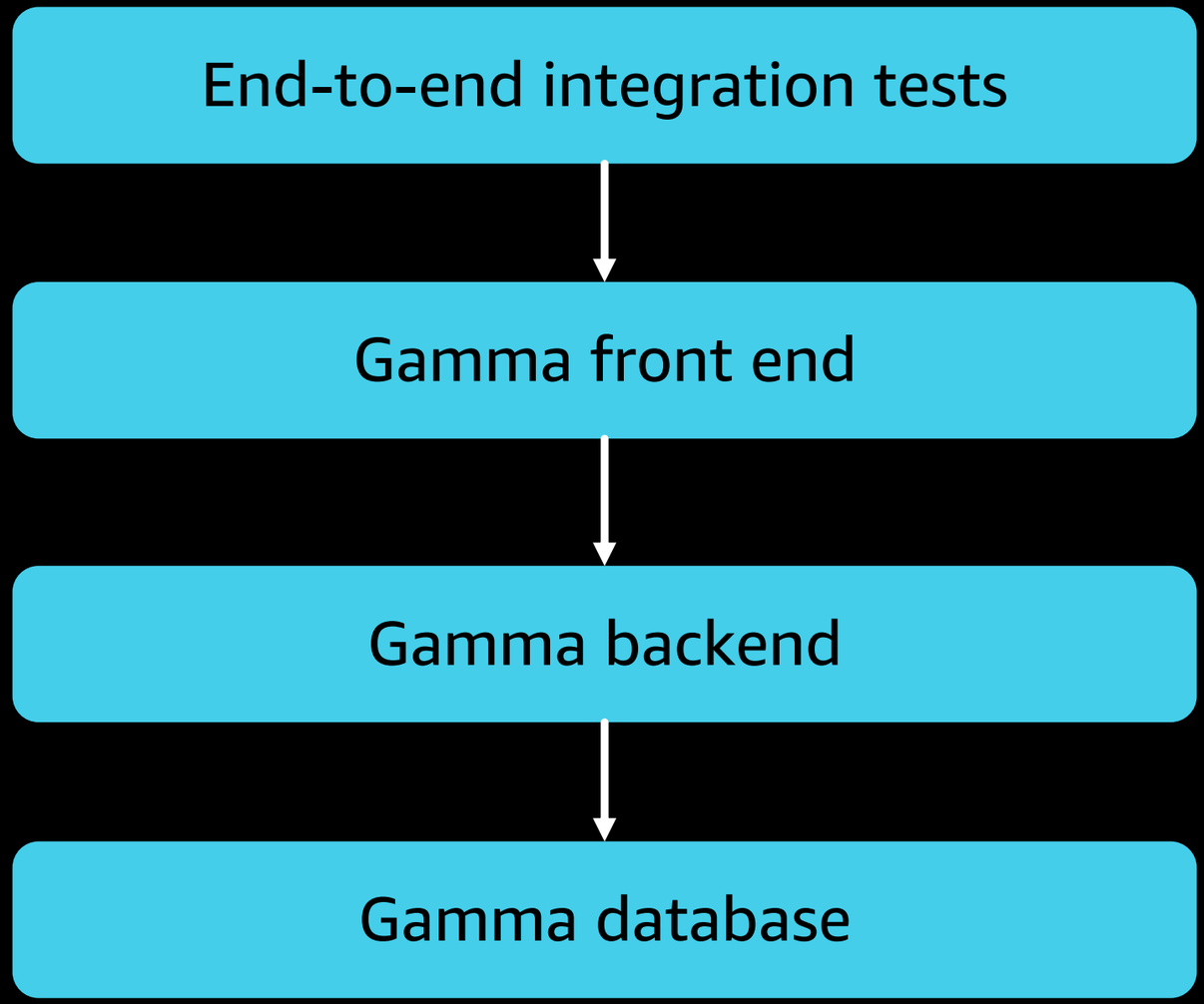
Pre-production environments



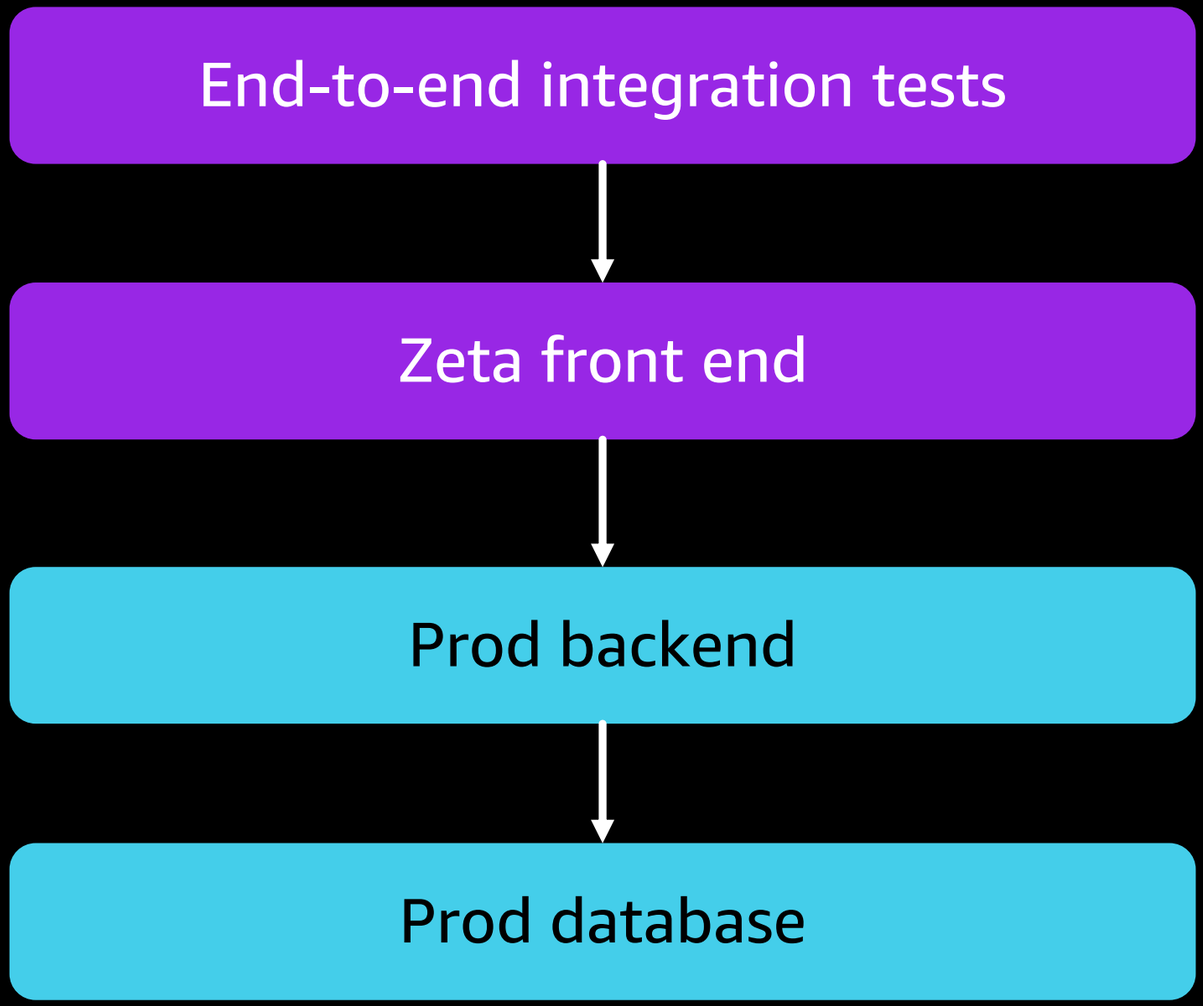
Backward-compatibility testing



Backward-compatibility testing



Backward-compatibility testing



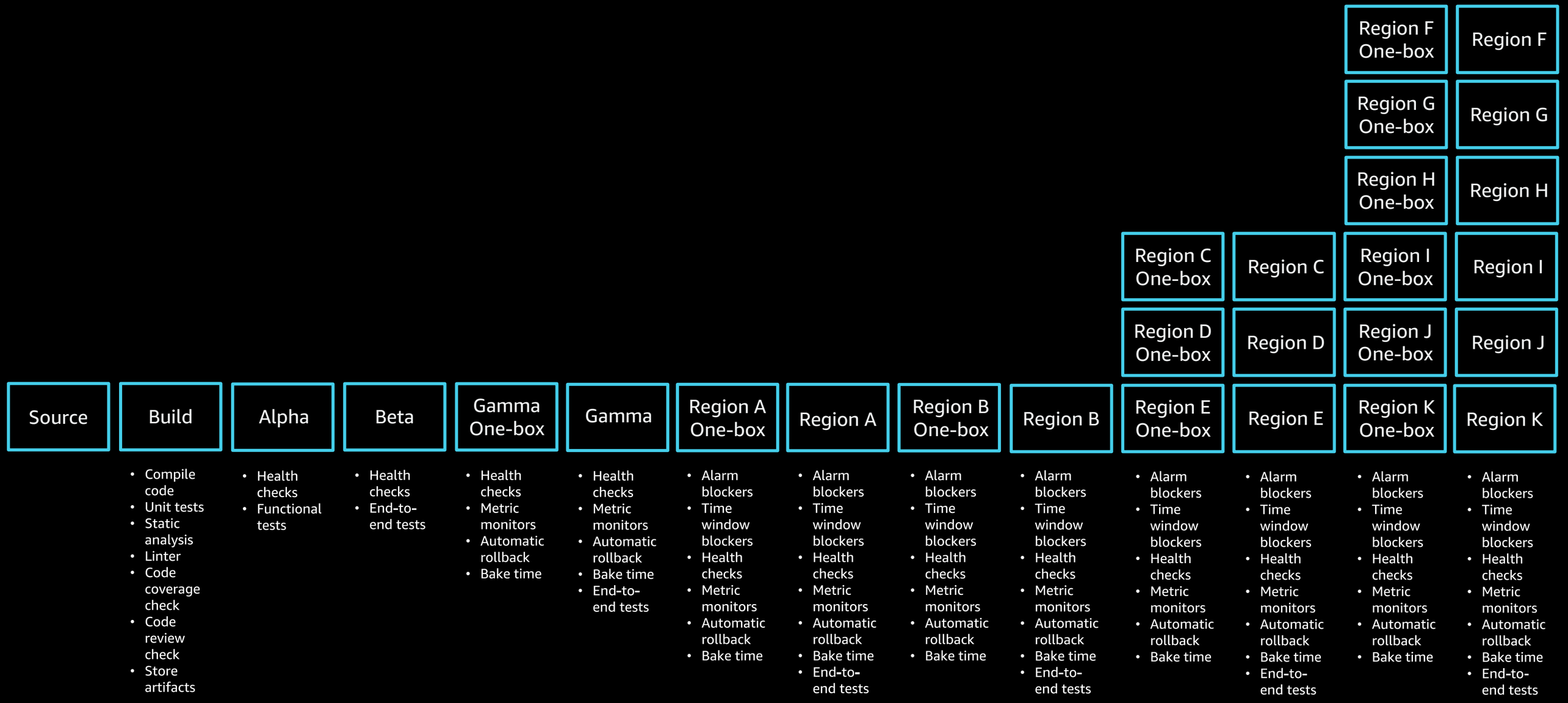
Automate pre-production testing

1. Test in multiple pre-production environments
2. Test the system end-to-end for every change
3. Test in a prod-like pre-production environment

Amazon’s approach to hands-off deployments

1. Balance safety and speed of deployments
2. Roll back deployments automatically
3. Automate pre-production testing

Typical AWS continuous delivery pipeline



Learn more about Amazon's approach to hands-off deployments:

https://aws.amazon.com/builders-library



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