Investigating the Potential of Automating Change Propagation in Clone-and-Own Development

Alexander Schultheiß

In collaboration with

Paul Maximilian Bittner

Timo Kehrer

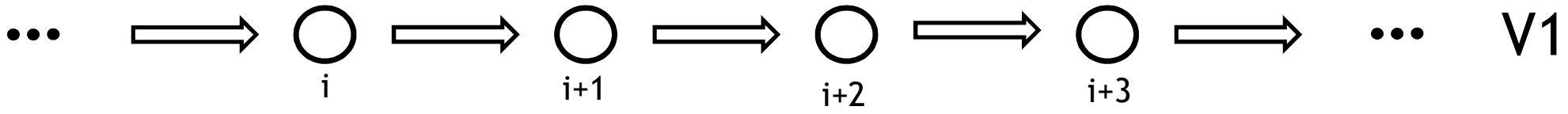
Thomas Thüm

Outline

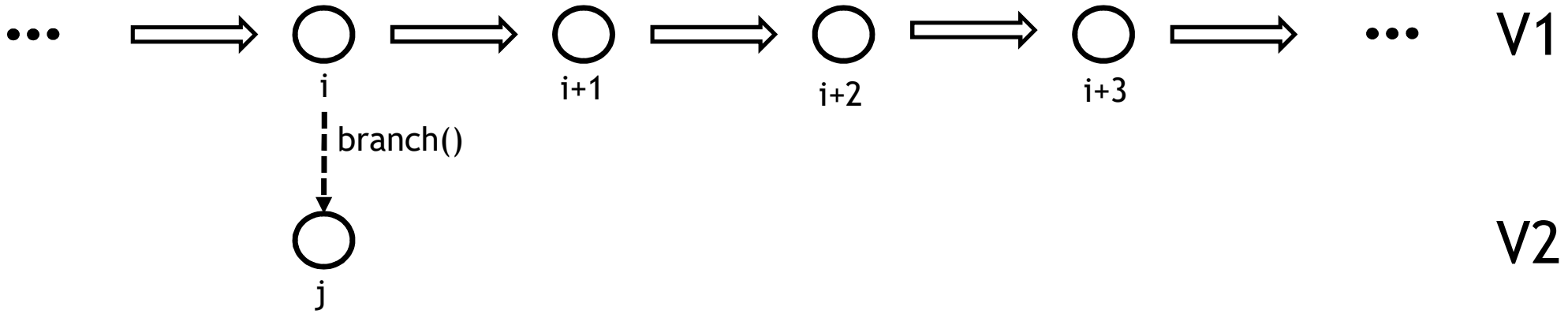
- Change Synchronization in Clone-and-Own
- Research Questions
- Extracting a Usable Dataset

Change Synchronization in Clone-and-Own

Variants in clone-and-own evolve side-by-side



Variants in clone-and-own evolve side-by-side



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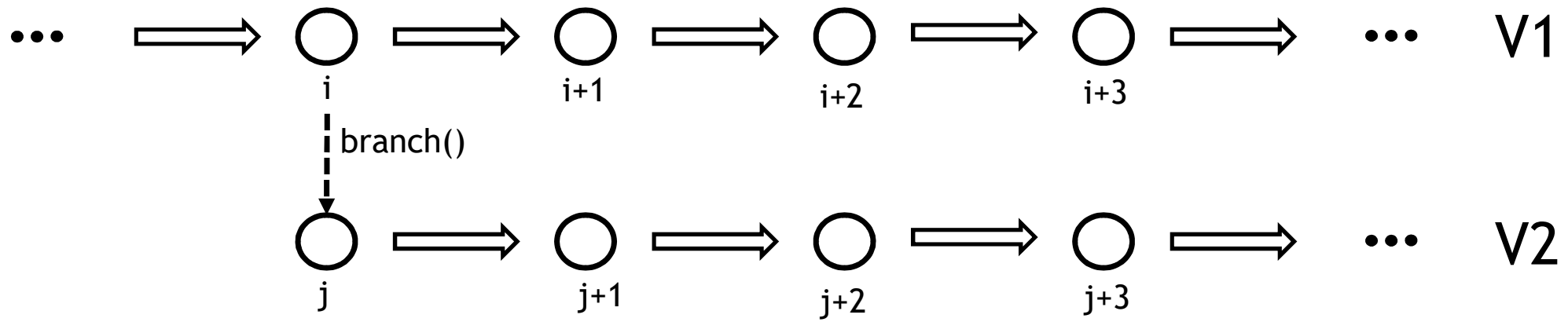

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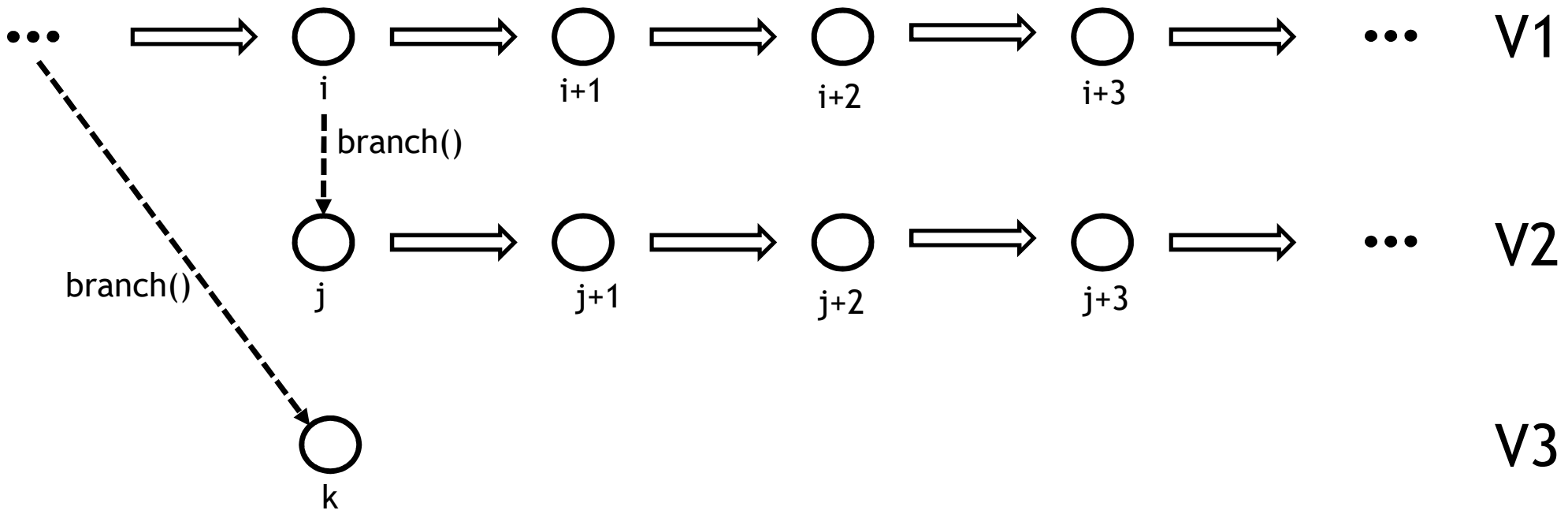

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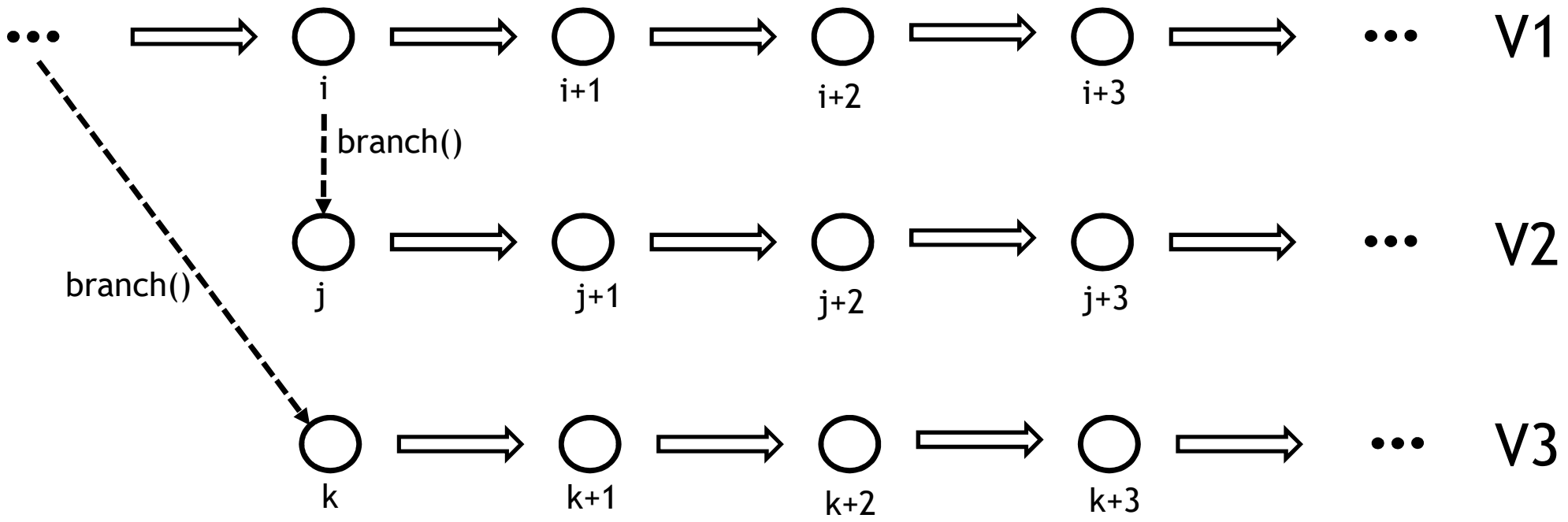
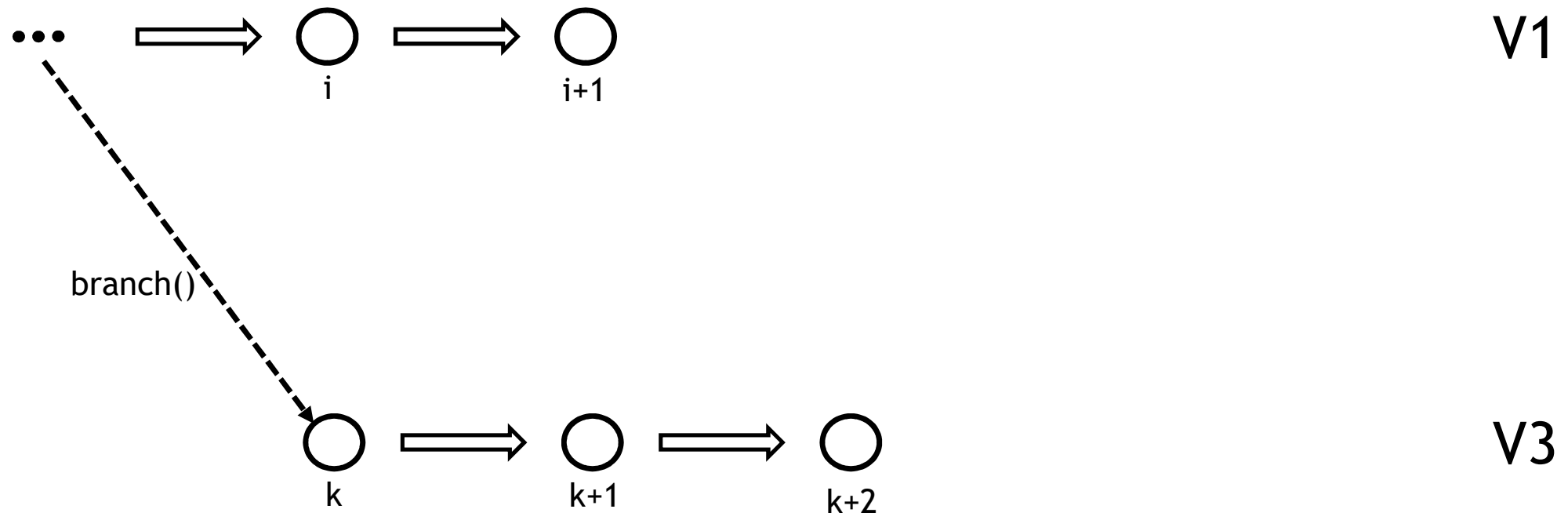


Some changes have to be synchronized



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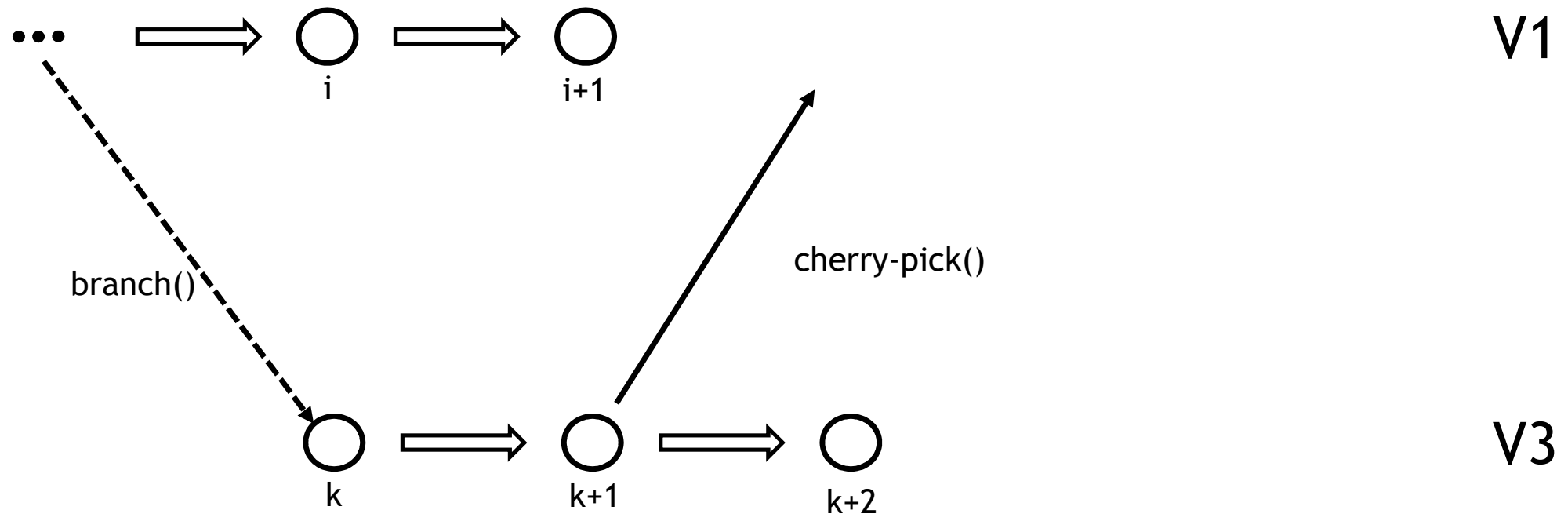

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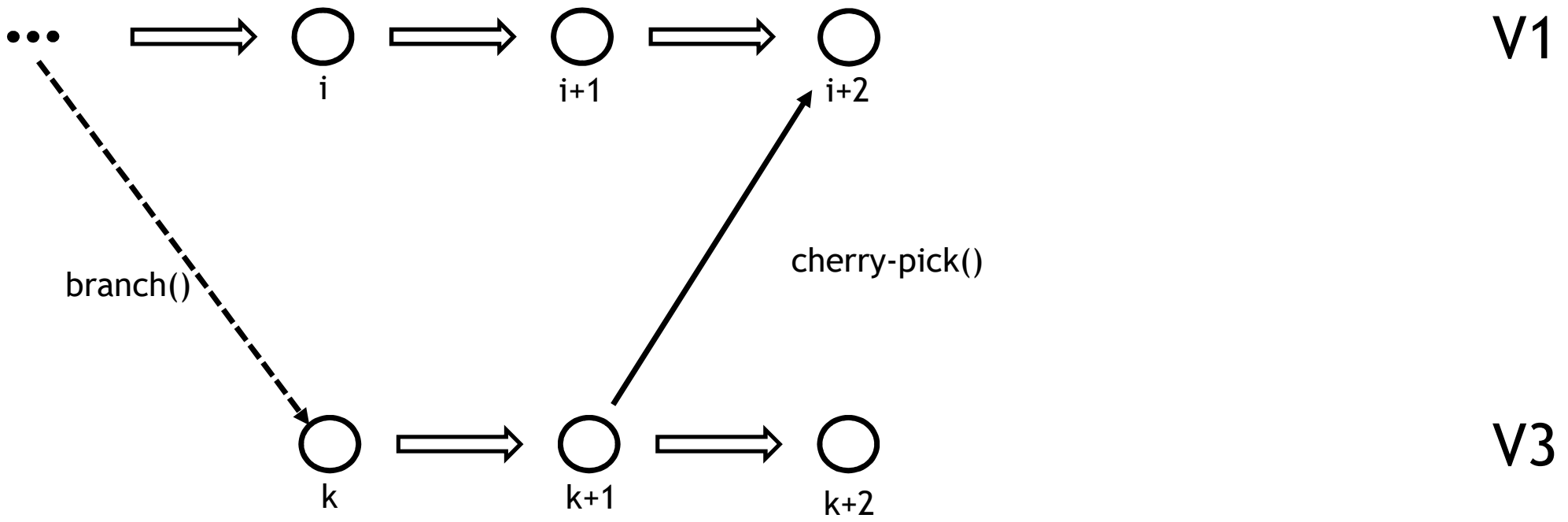

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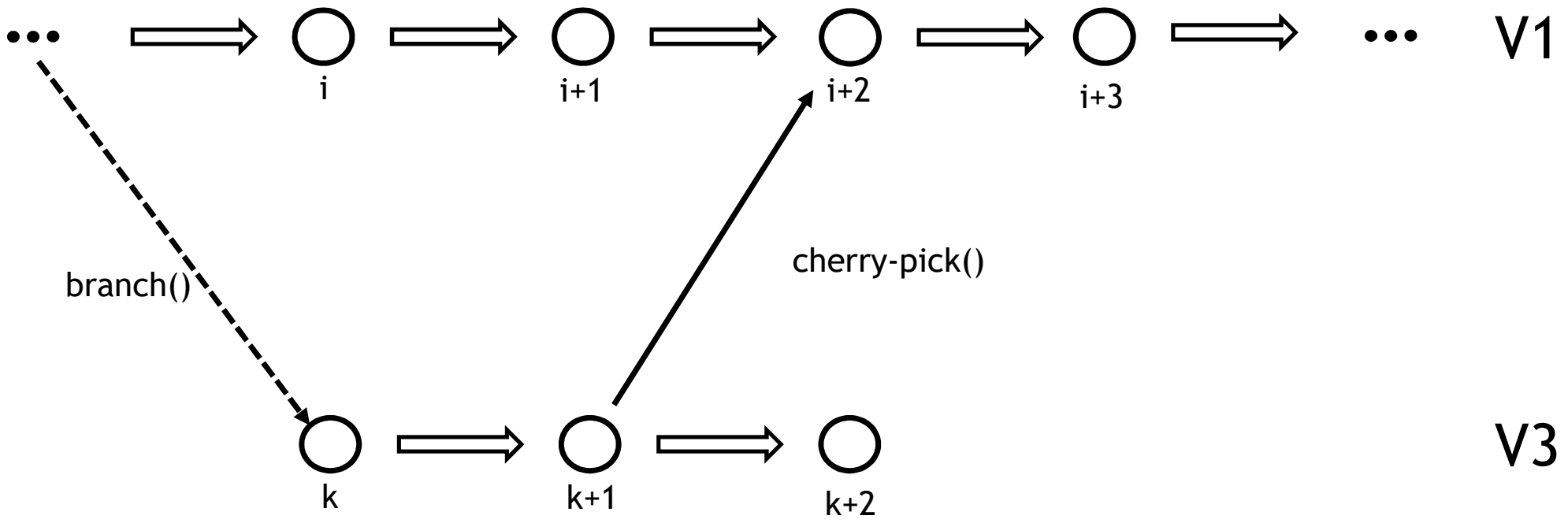

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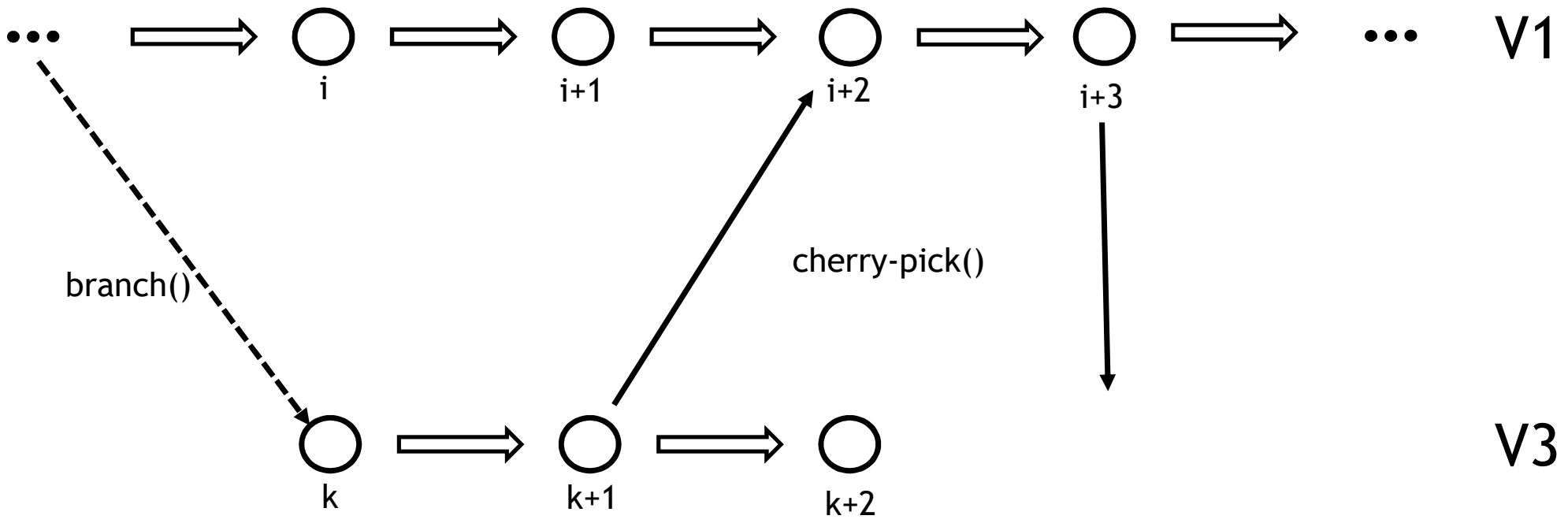

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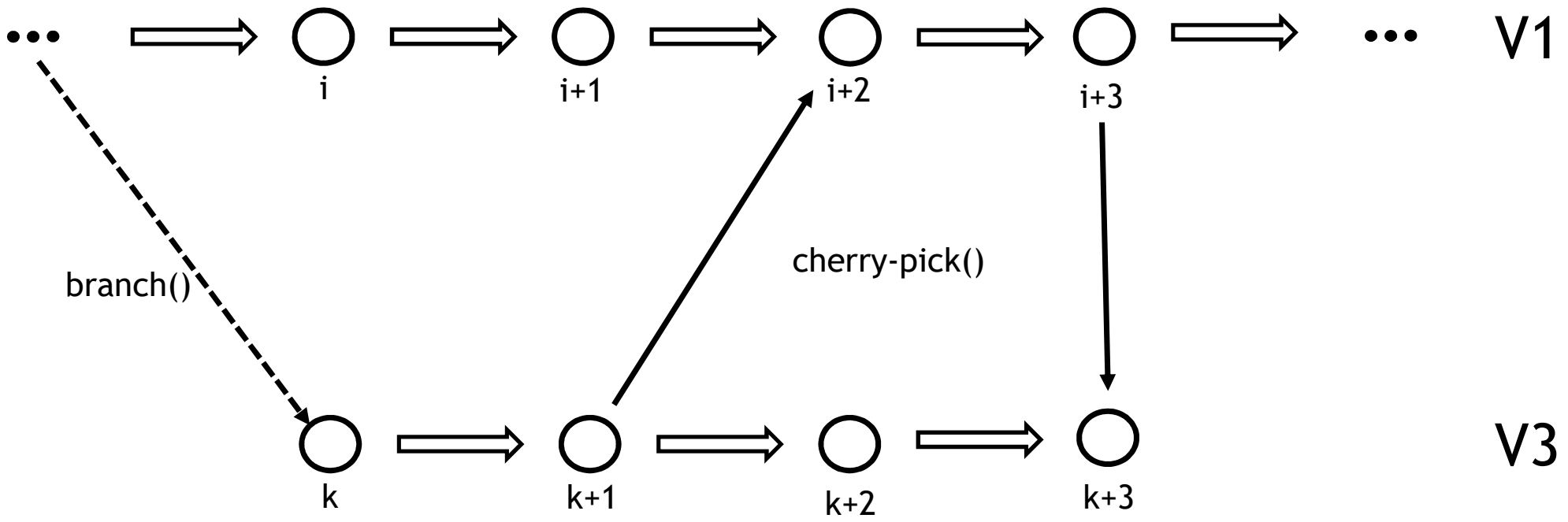
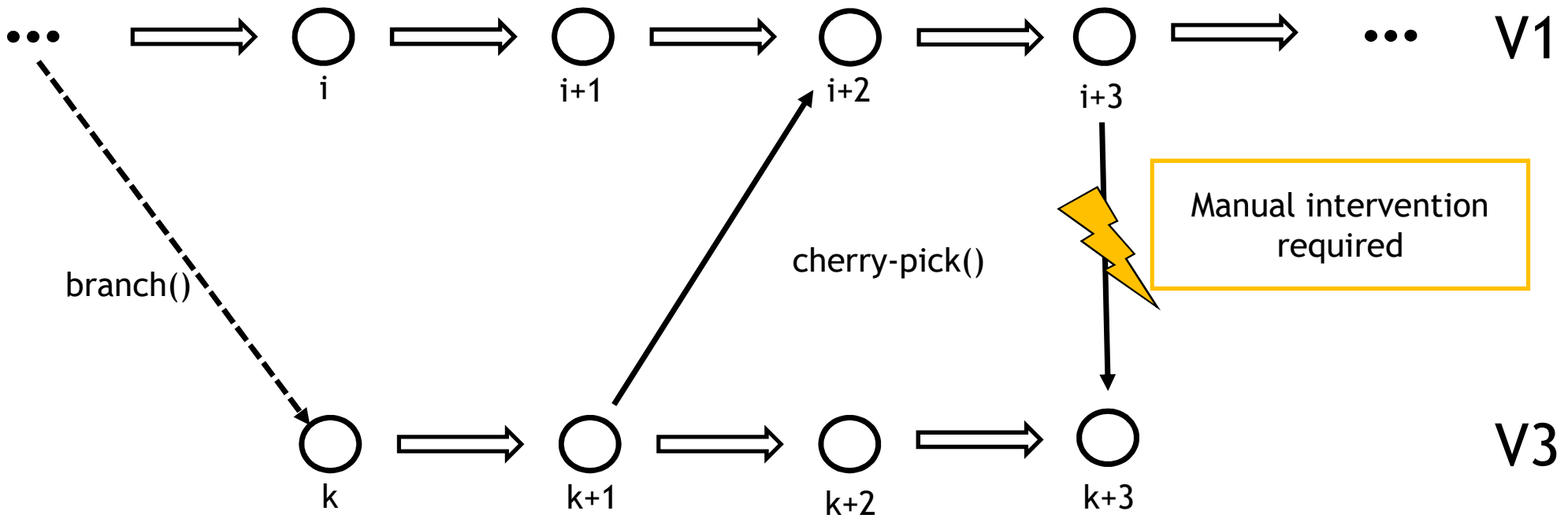


A cherry-pick might not succeed



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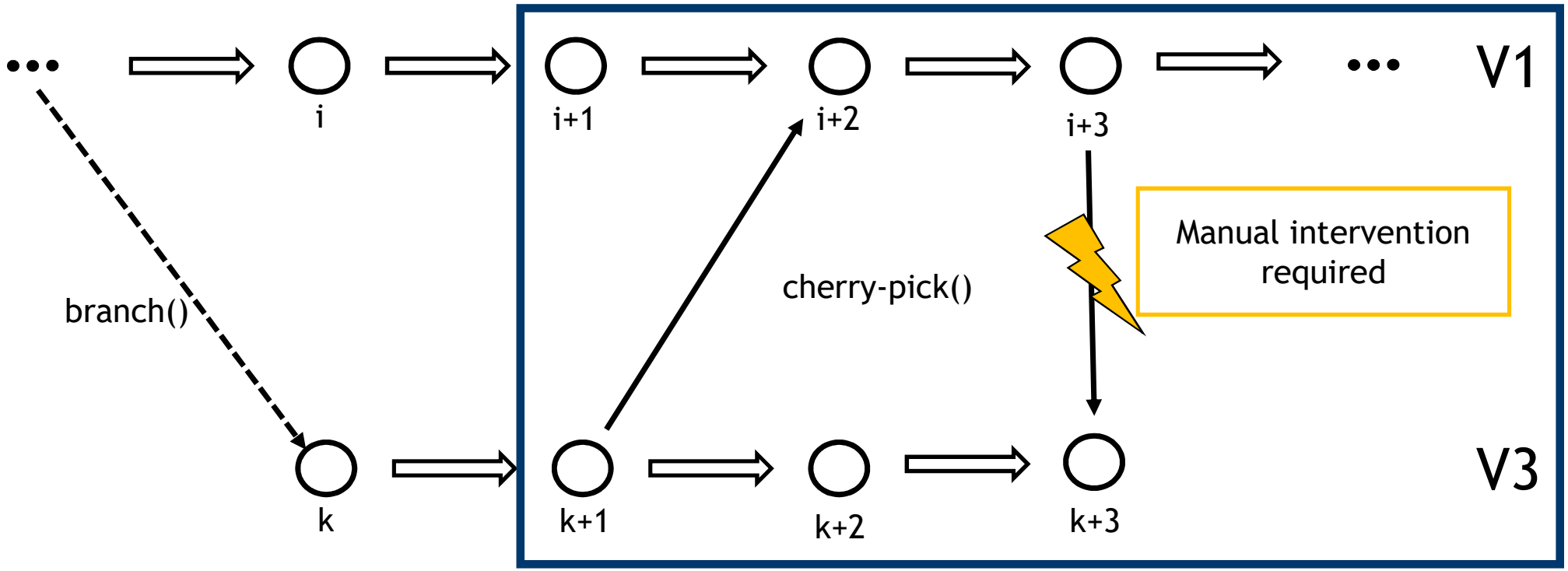
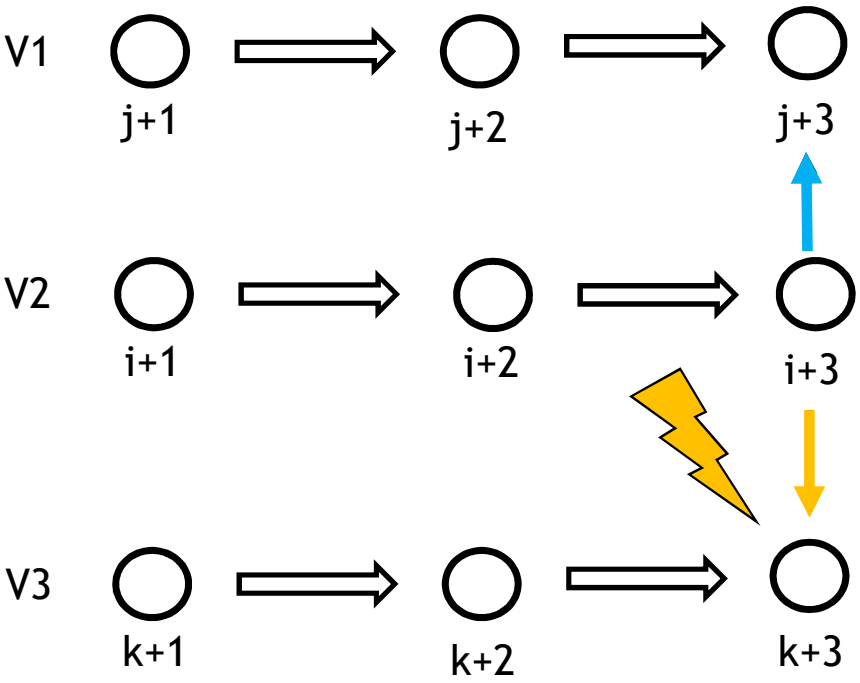


RQ1

Applicability of commit-sized patches (cherry-picking)

RQ1: How many commit-sized patches are applicable?



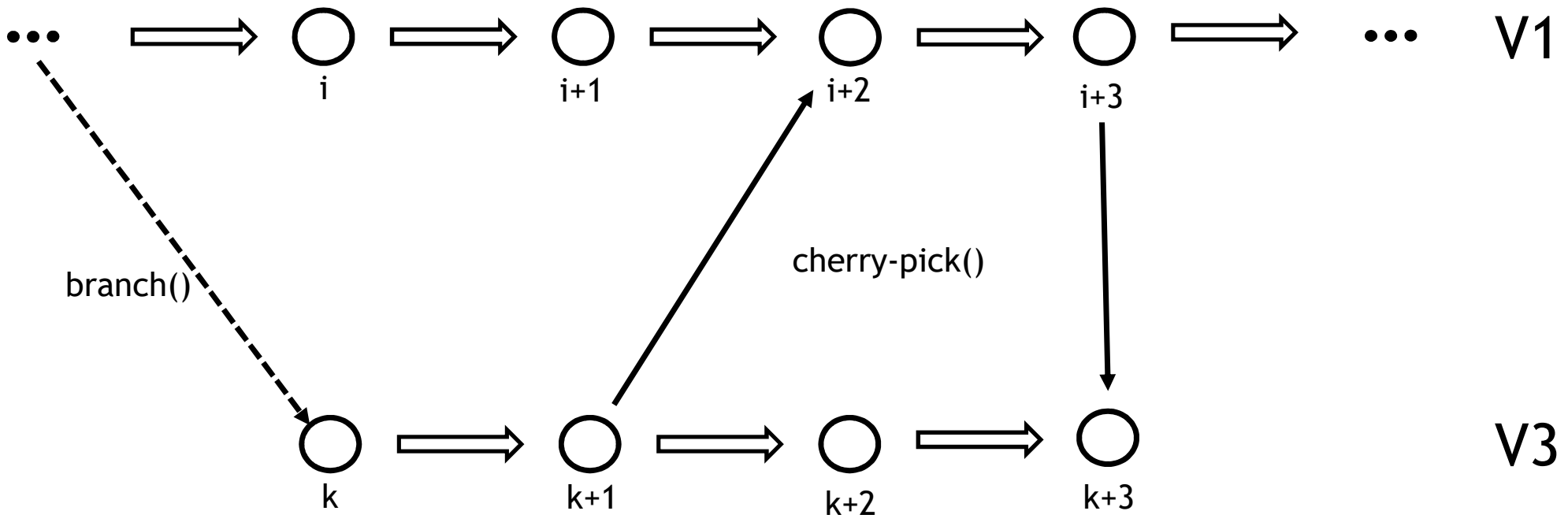
Quantitative Evaluation

- propagate a commit to other variants
- count how often patching succeeds or fails

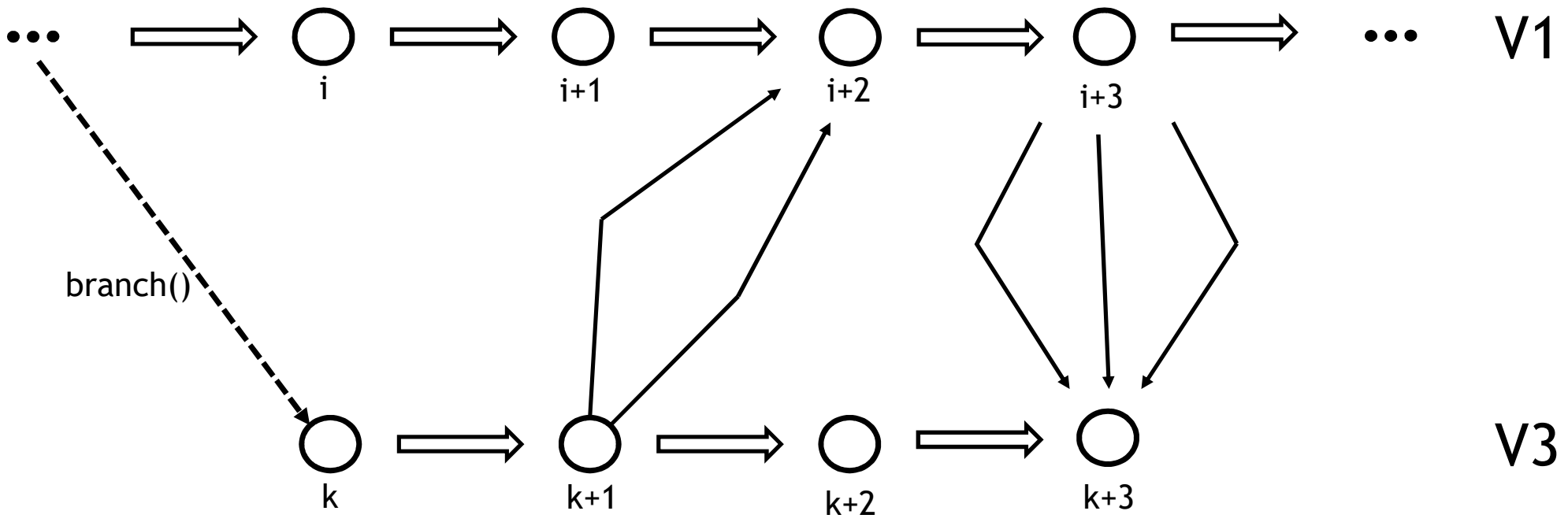
RQ2

Applicability of edit-sized patches

Some changes have to be synchronized



We can split patches



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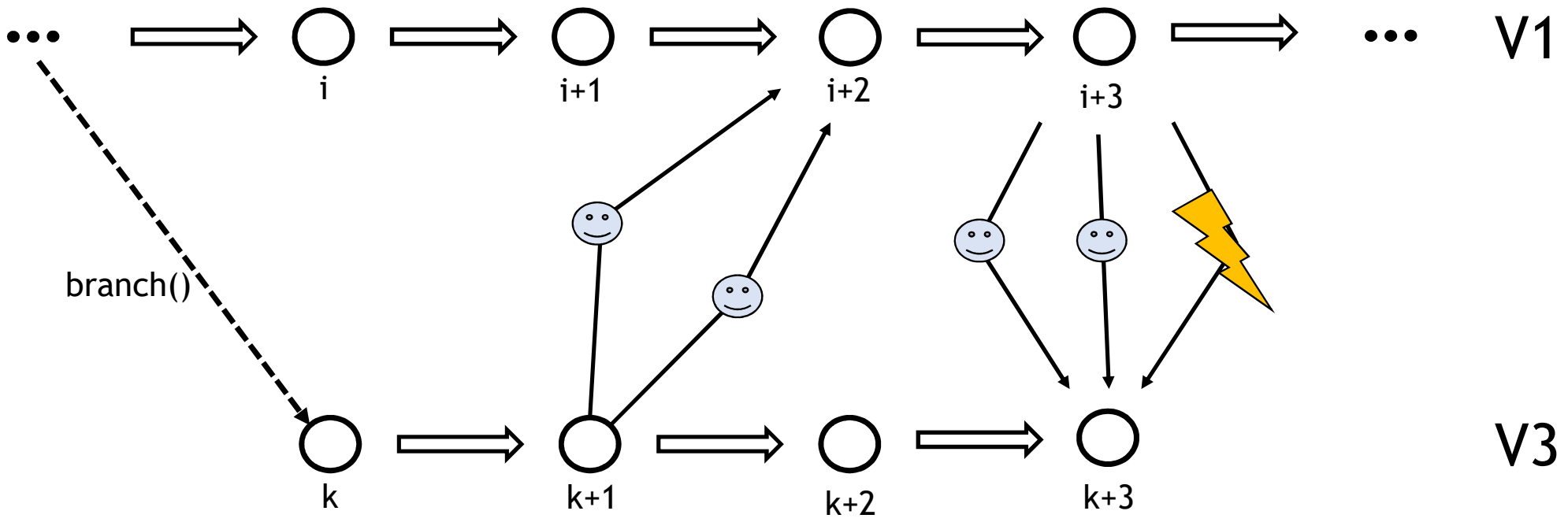
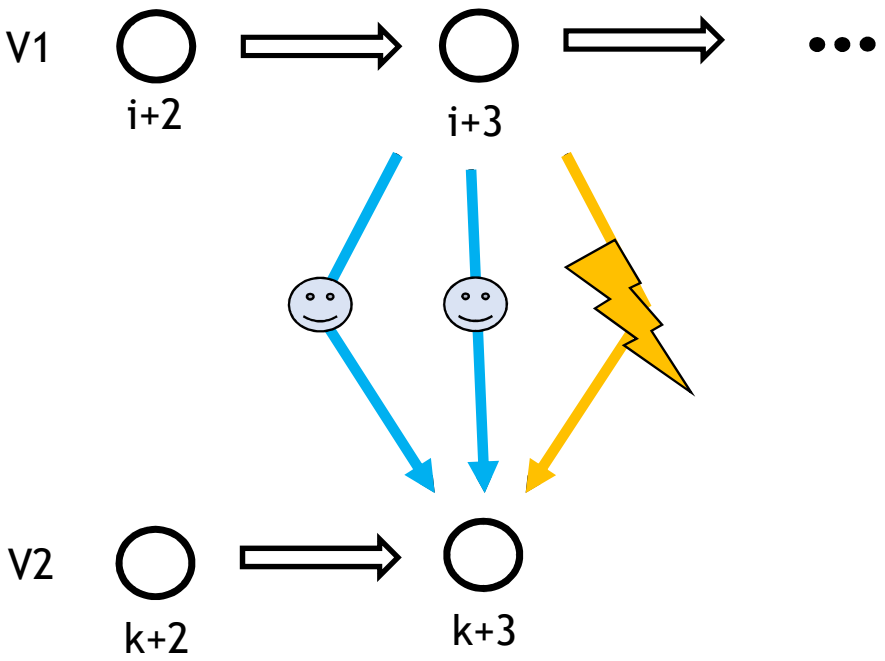


RQ2: How many edit-sized patches are applicable?

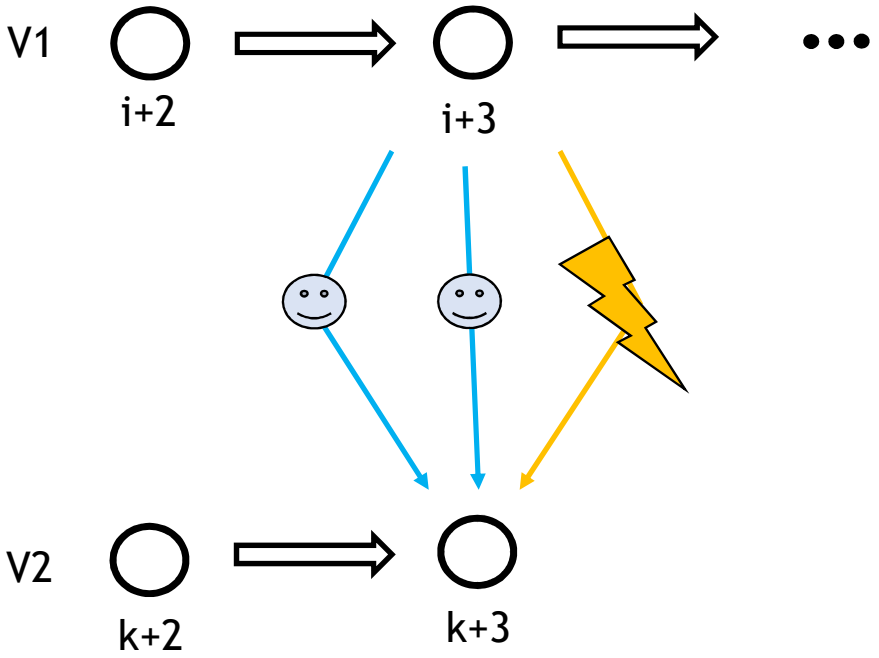


- Quantitative Evaluation
- split commit into edits
- propagate edits to other variants
- count how often patching succeeds or fails

RQ3

Applicable patches and required patches

Not all changes might be required

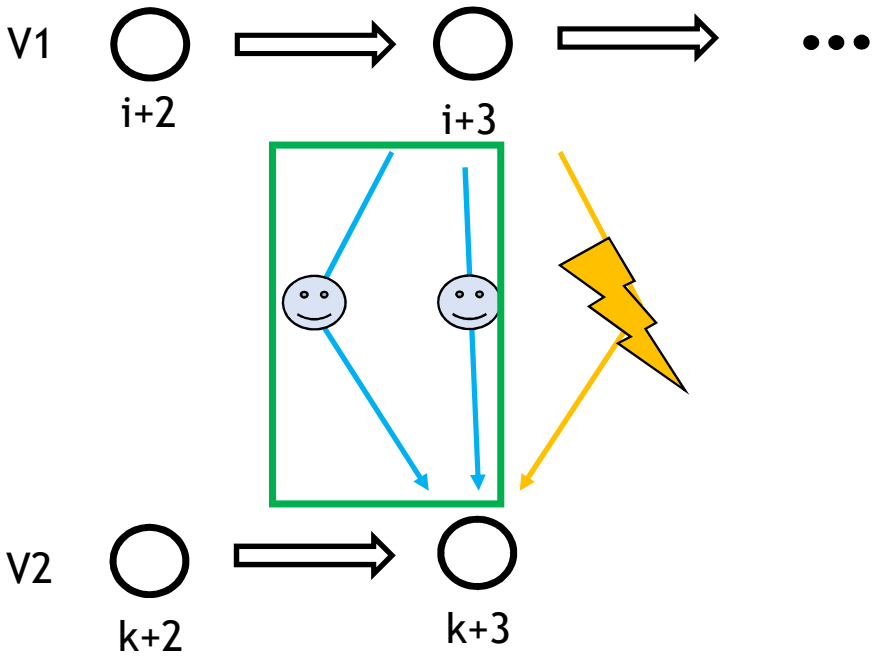


{**A**, B, **C**}

configurations

{**A**, B, D}

Not all changes might be required



{A, B, C}

configurations

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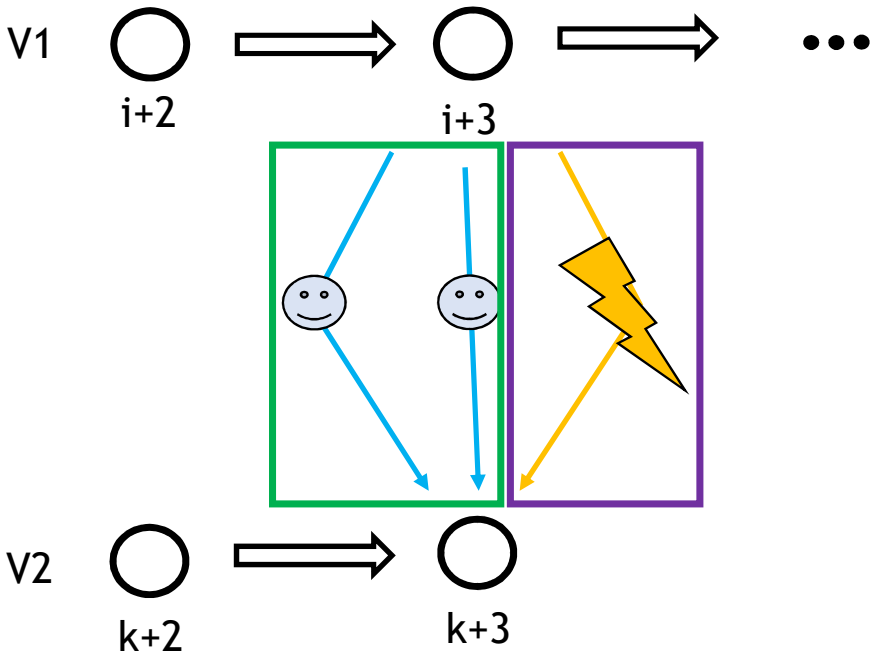

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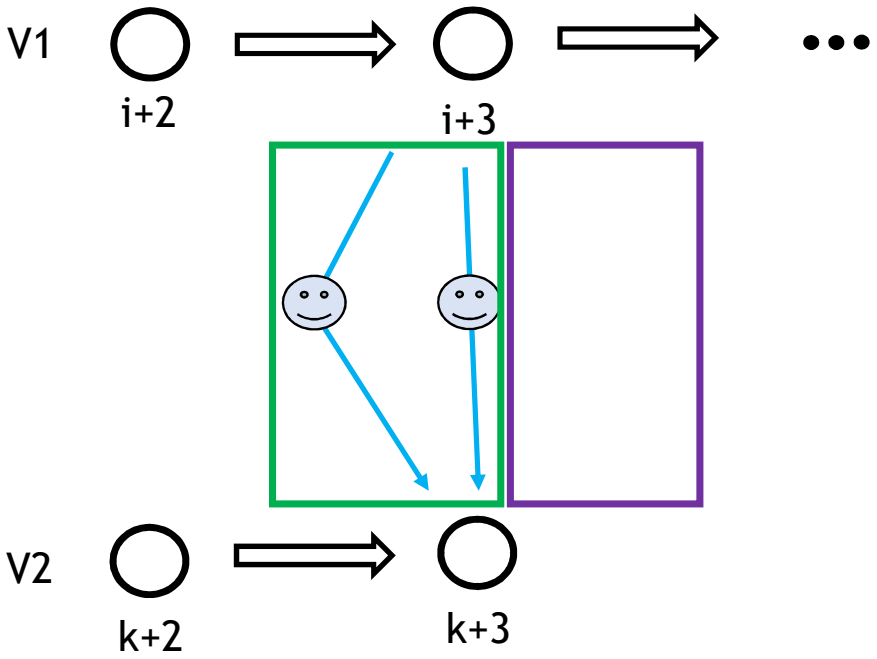

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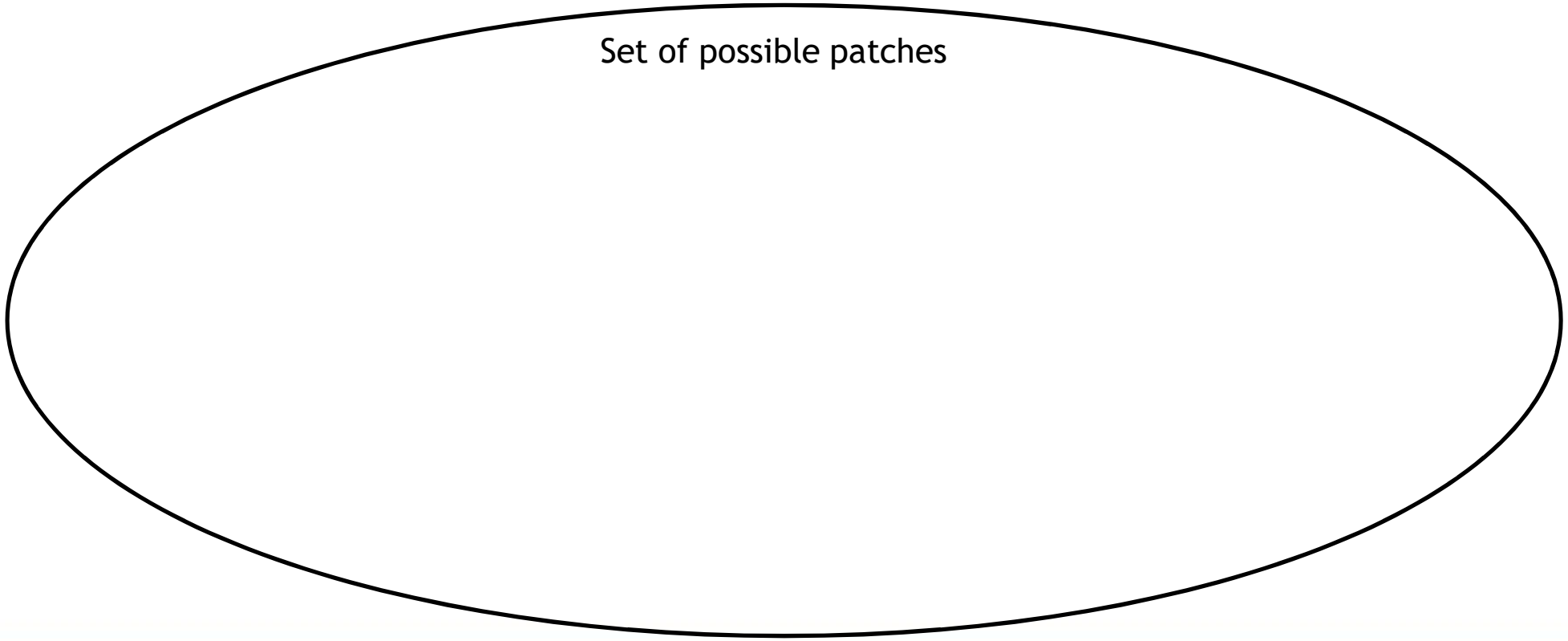
RQ3: What is the ratio between applicable and required patches?



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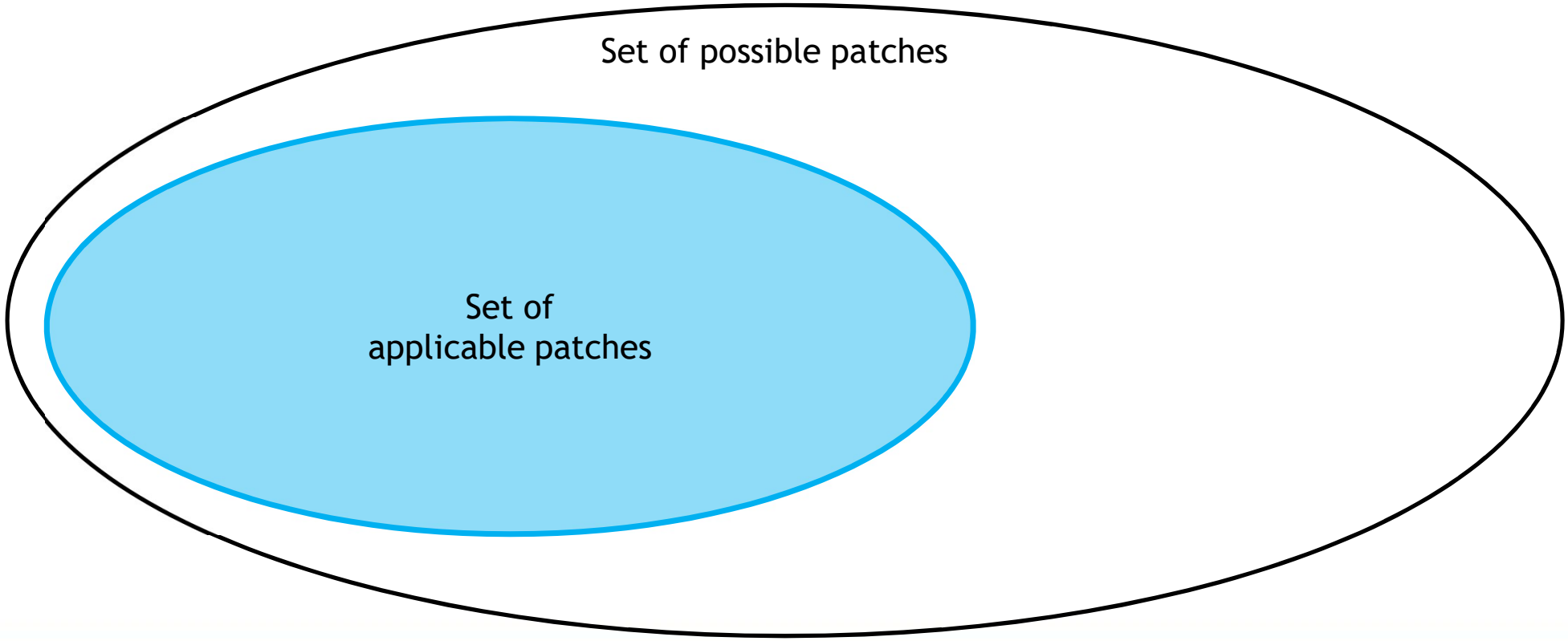

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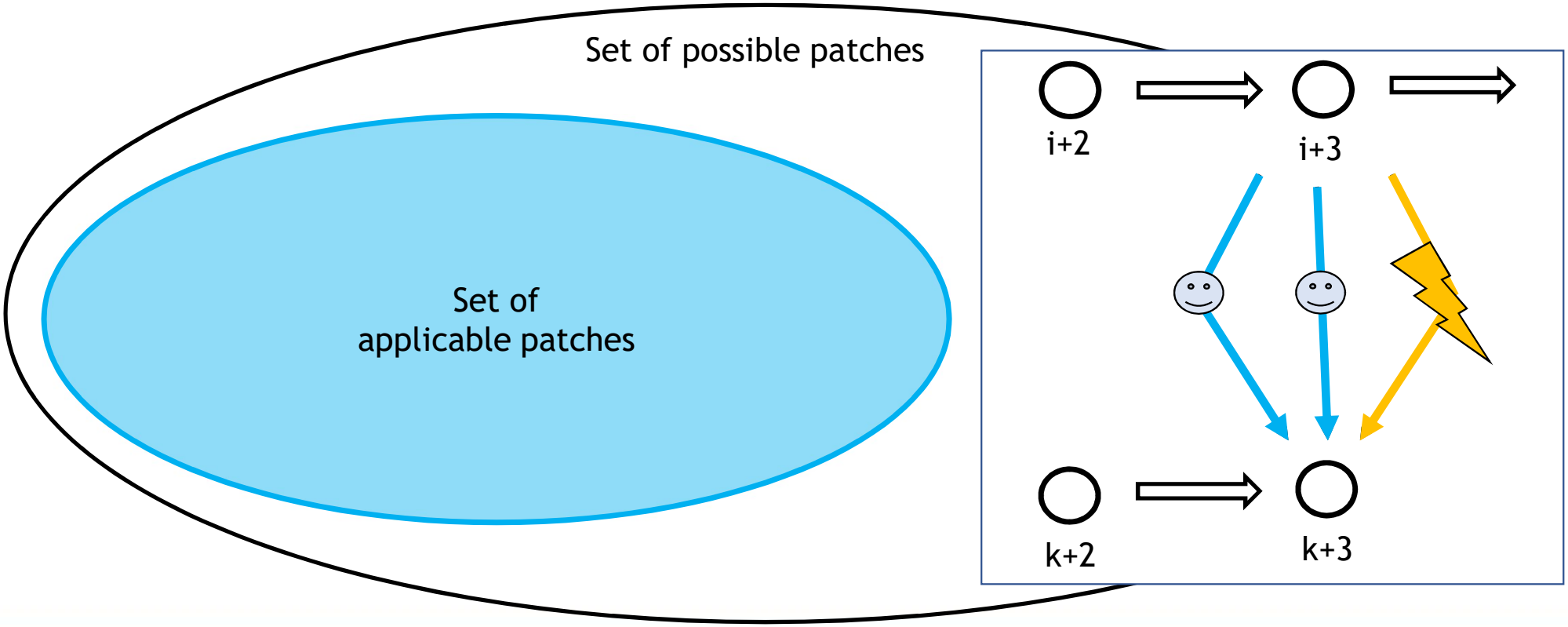

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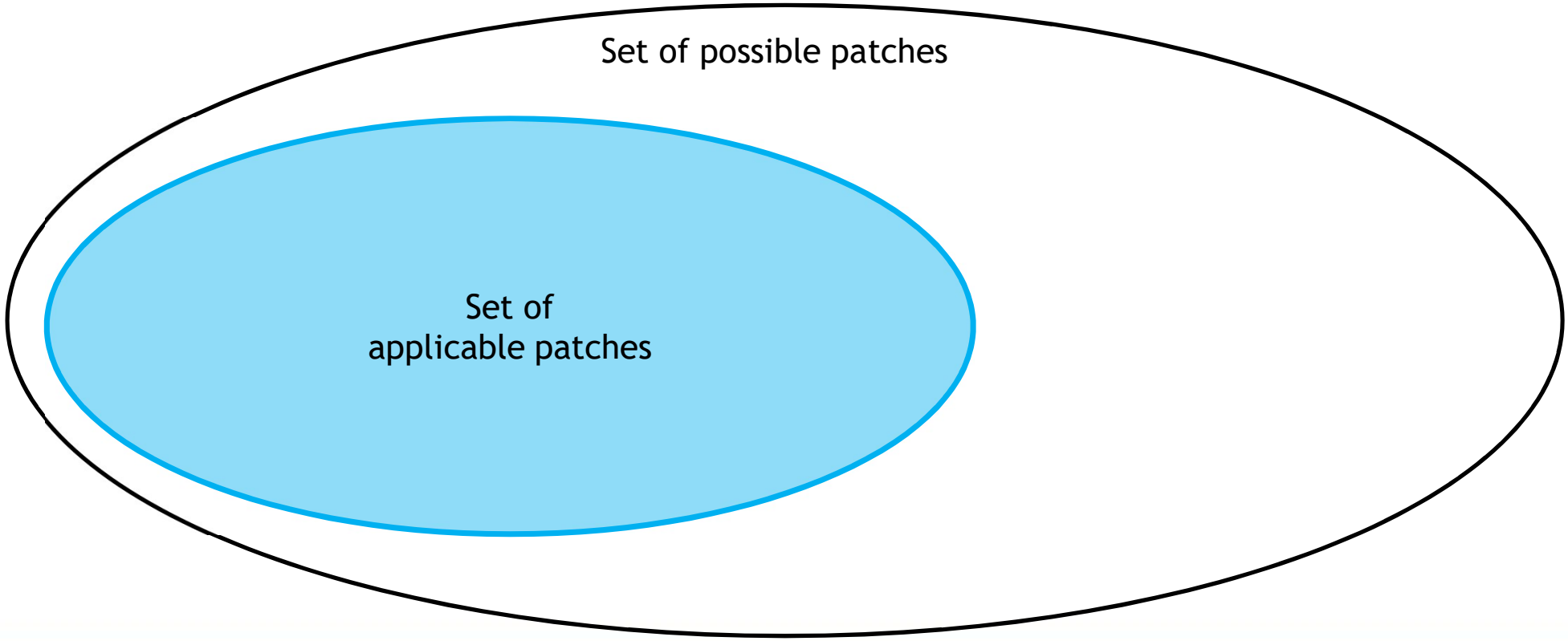

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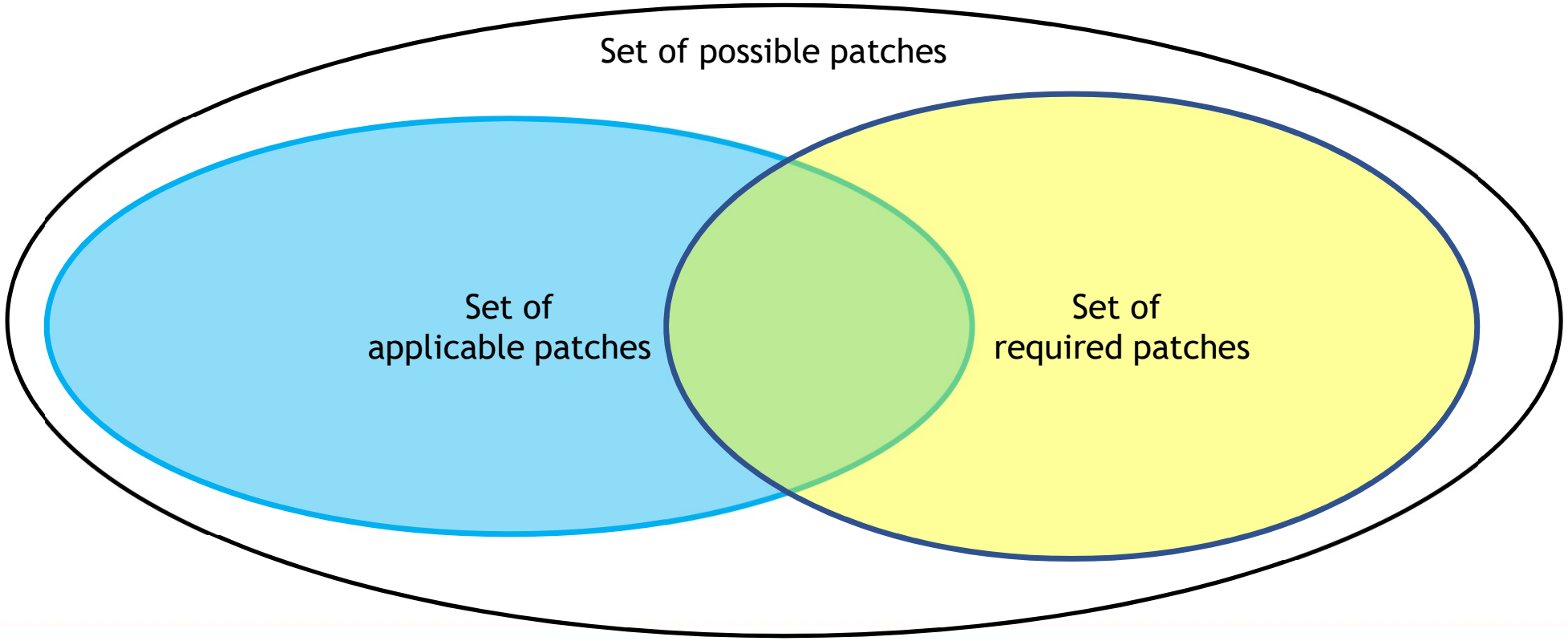

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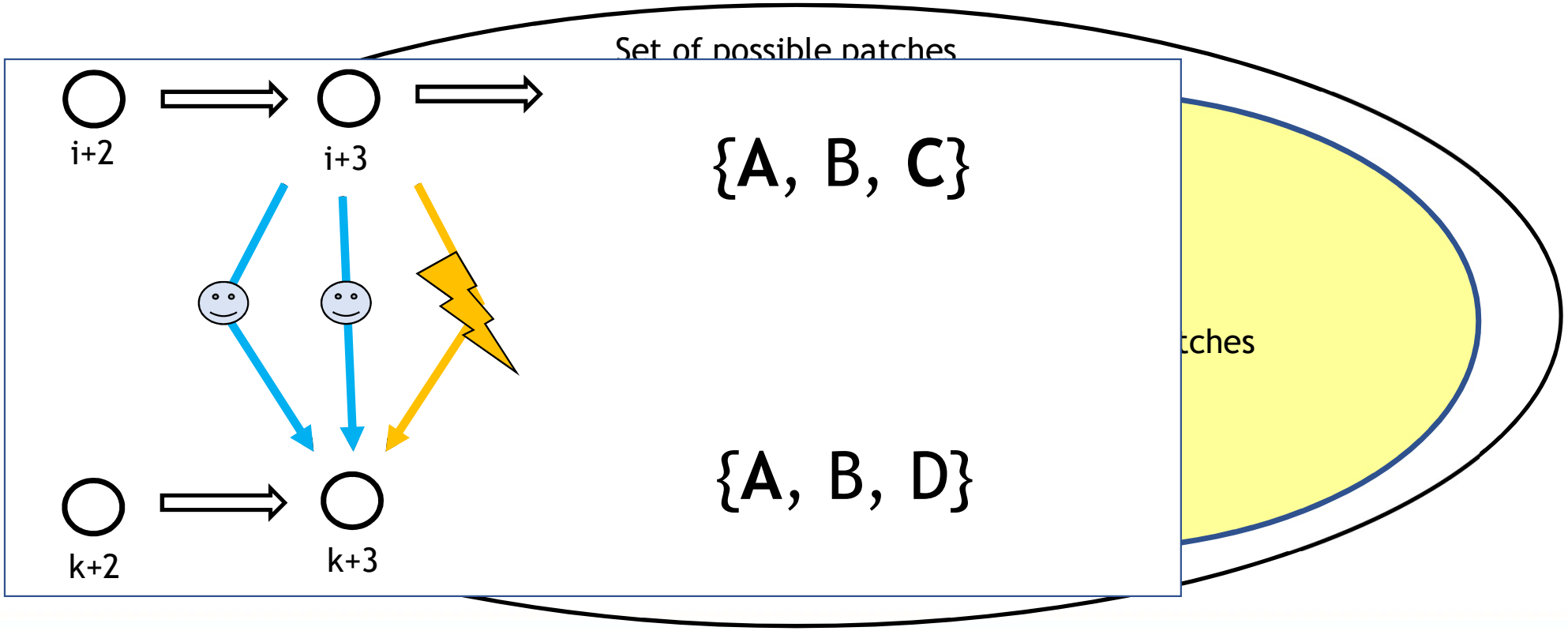

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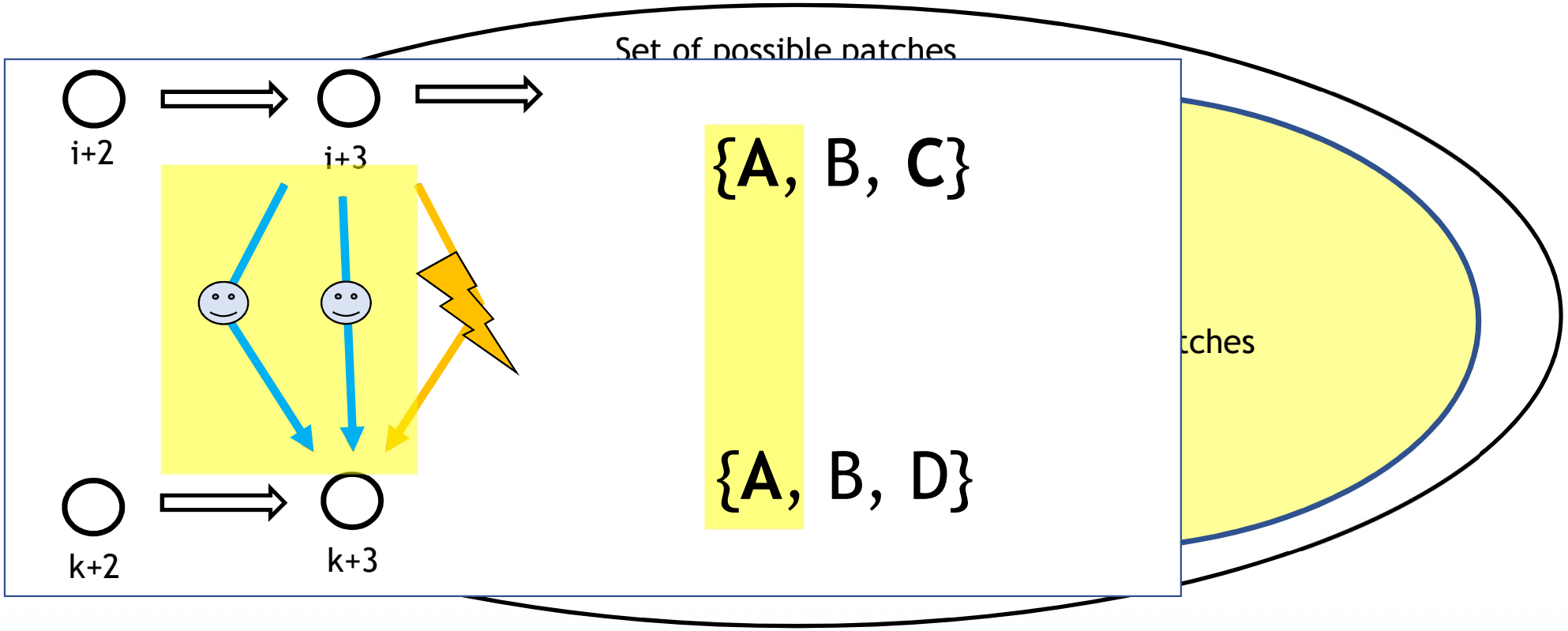

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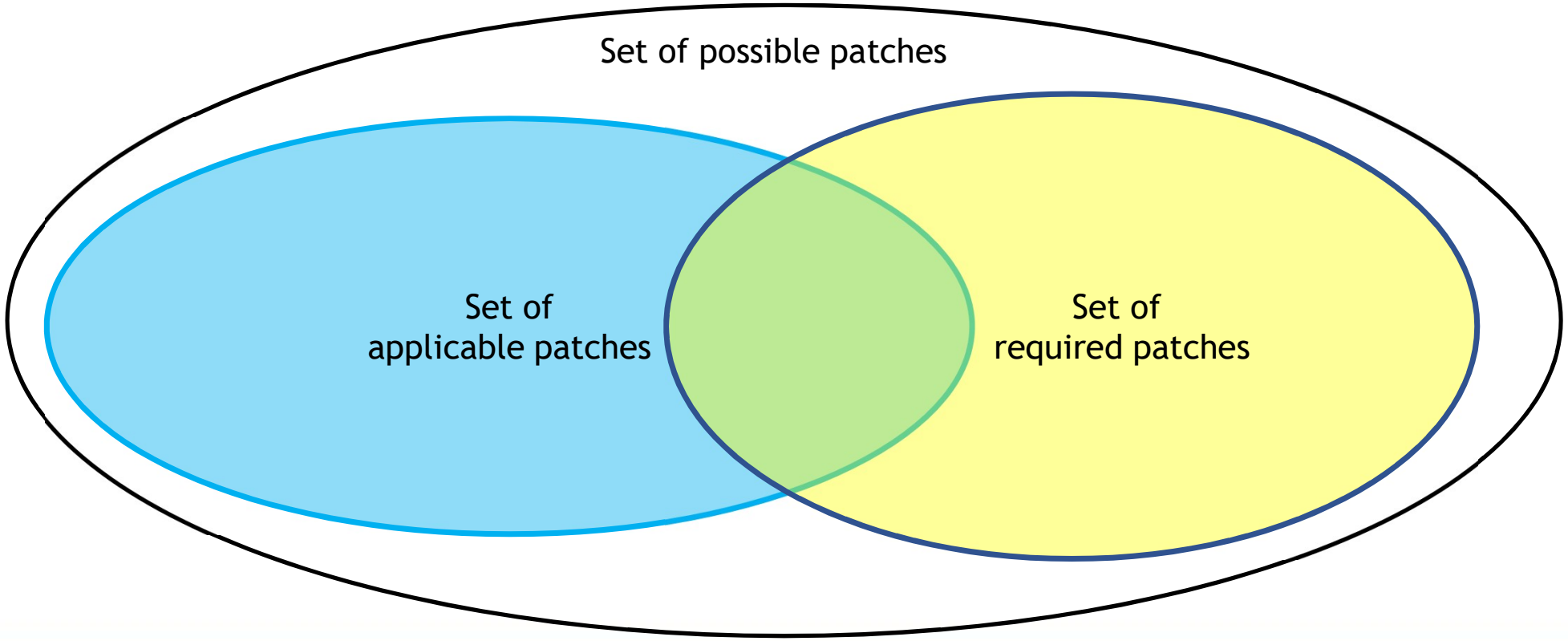

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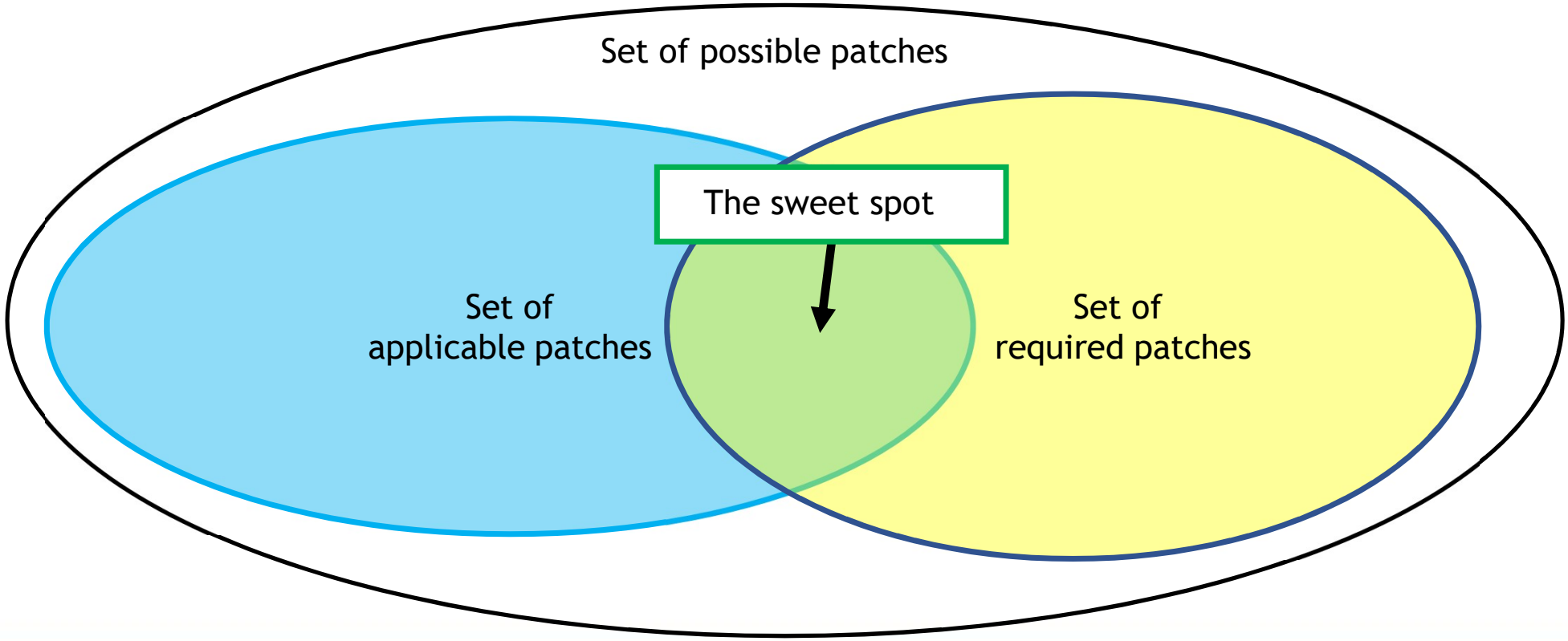
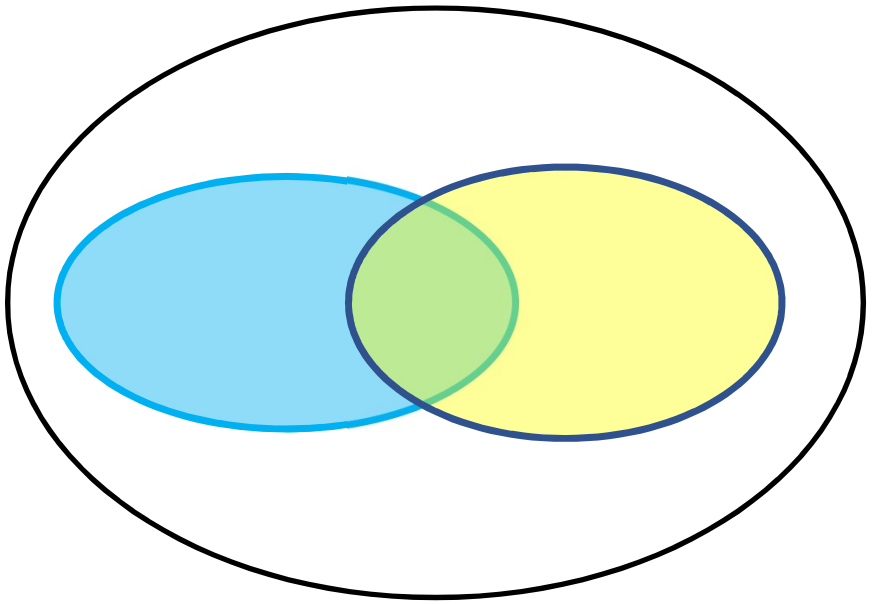


RQ3: What is the ratio of applicable to required patches?



Quantitative evaluation

- count how many patches are applicable
- count how many patches are required
- count how many are required and applicable

We require a dataset with

- The history of each variant
- Presence conditions of files and lines
- Configuration of each variant

Outline

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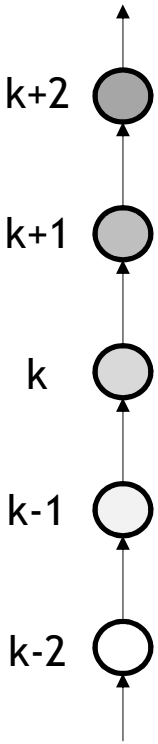
- Research Questions
- Extracting a Usable Dataset

Extracting a Usable Dataset

We consider the evolution of variants in Linux

We extract the variability information in linux sources



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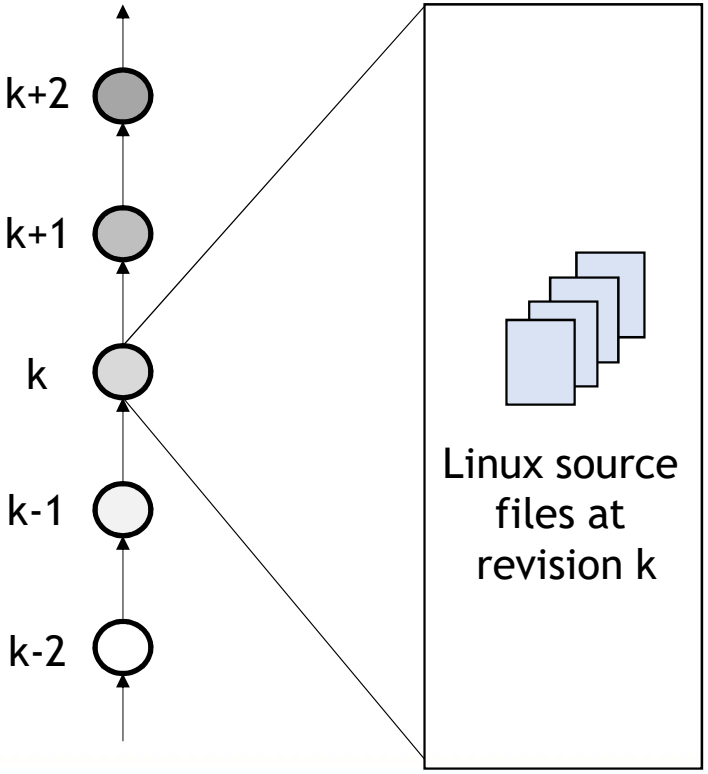

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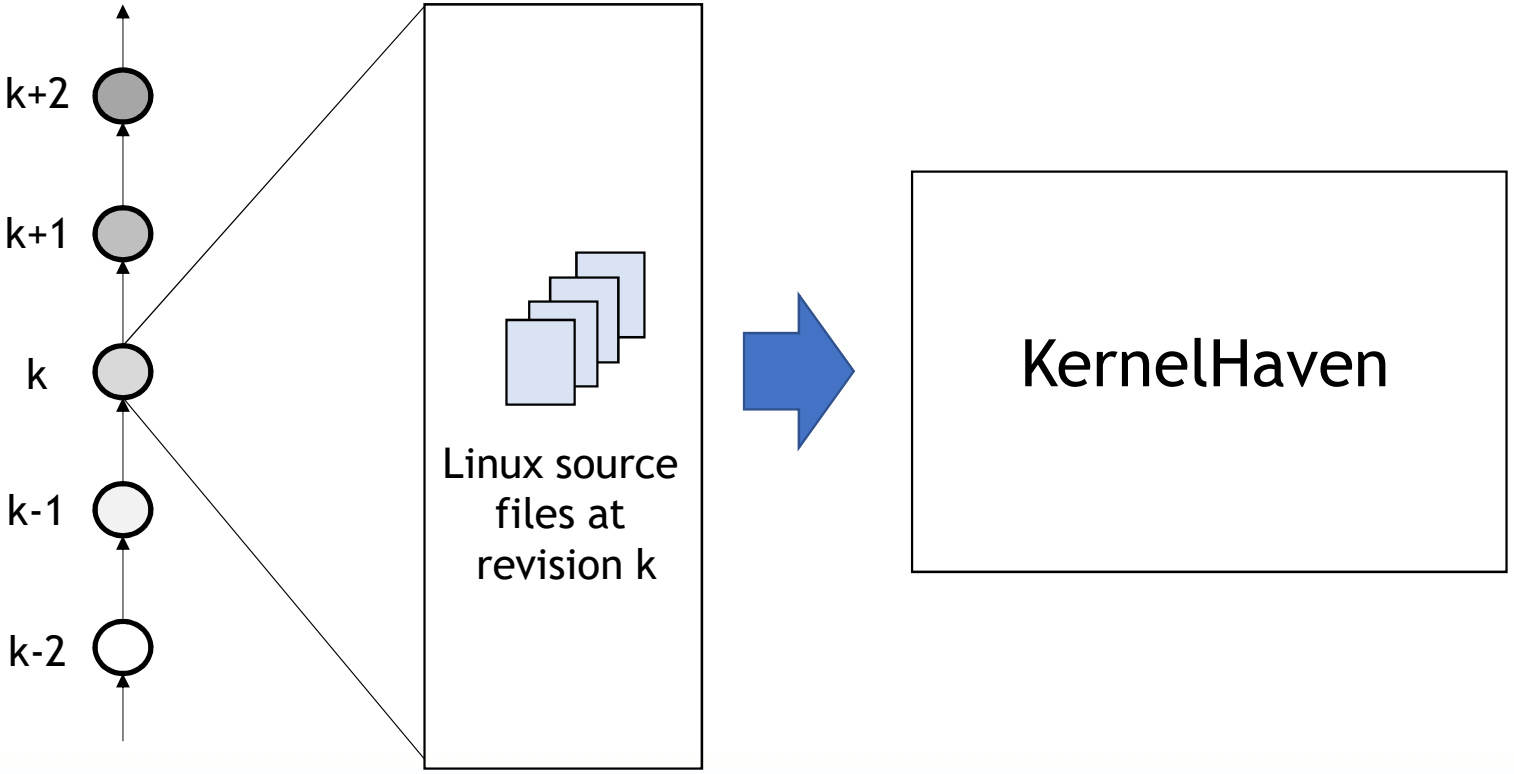

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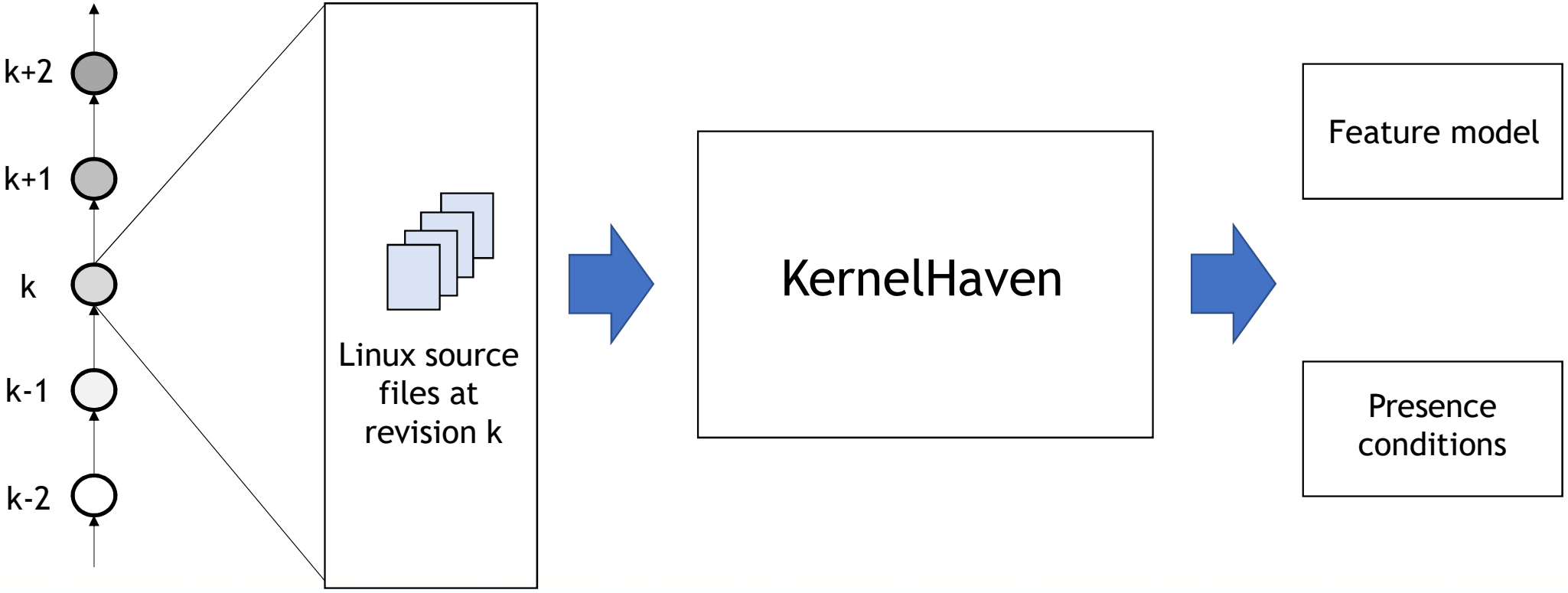
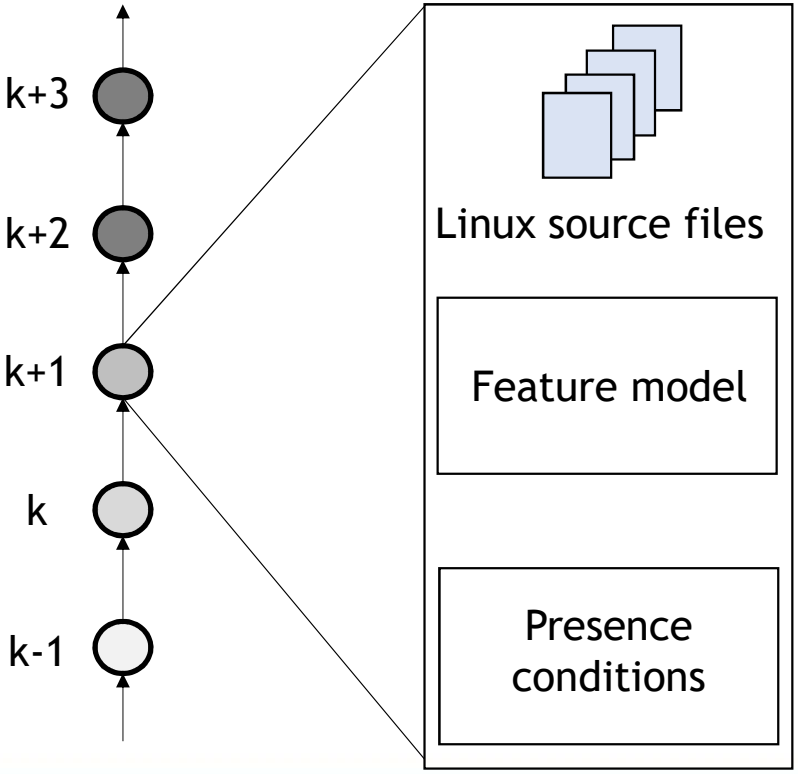


We generate variants based on variability



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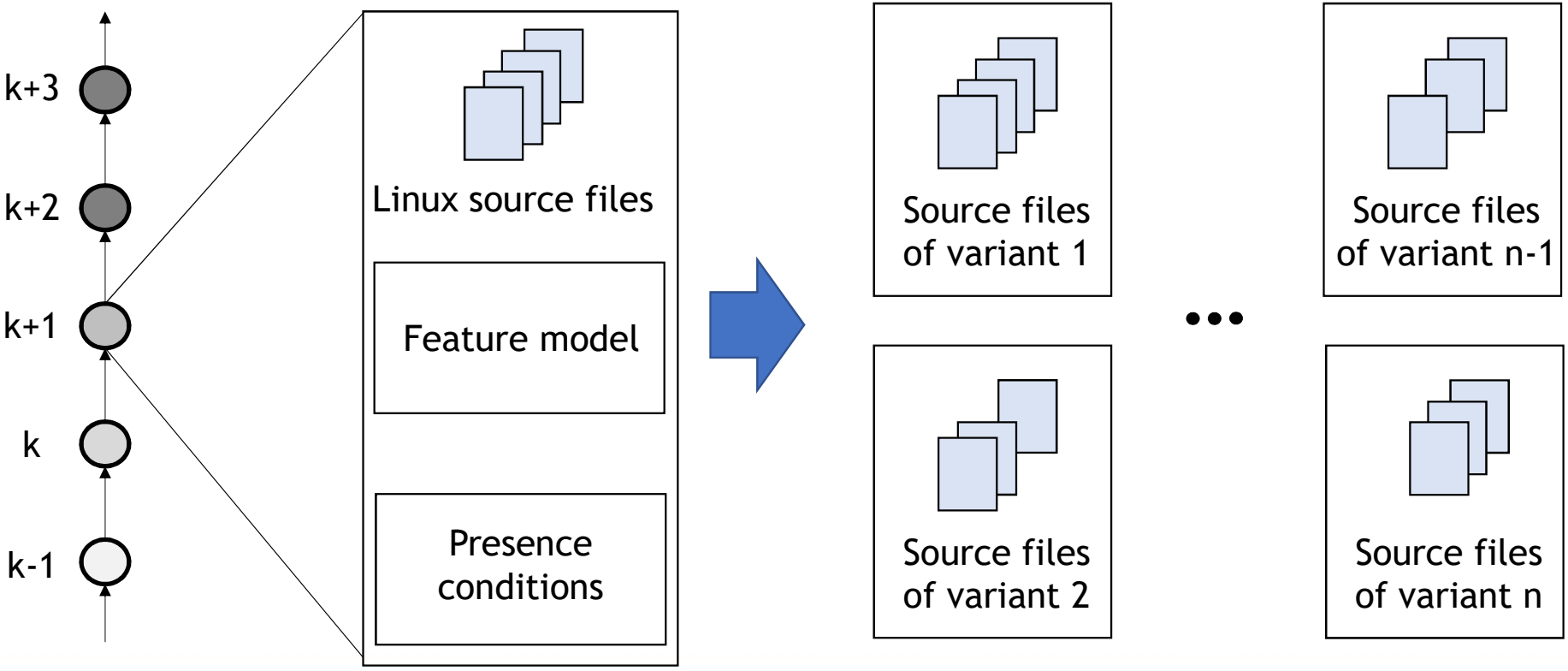
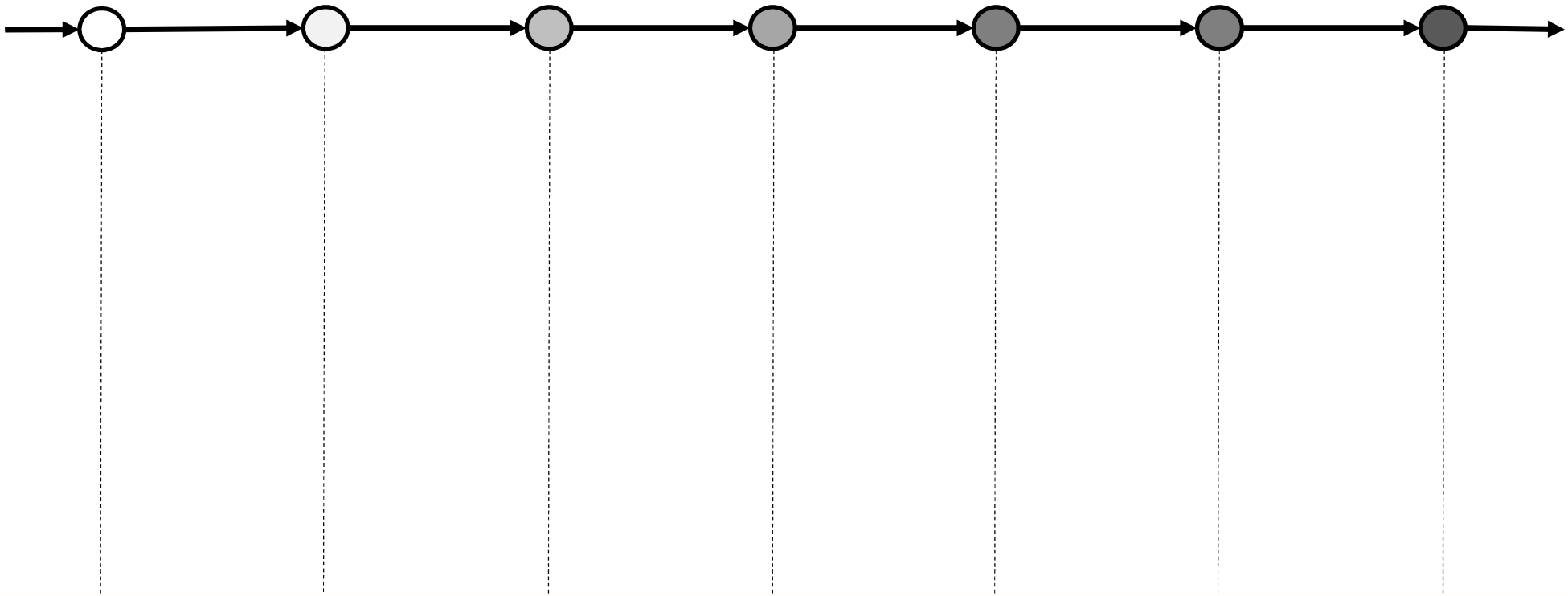


Not all variants are changed in a commit



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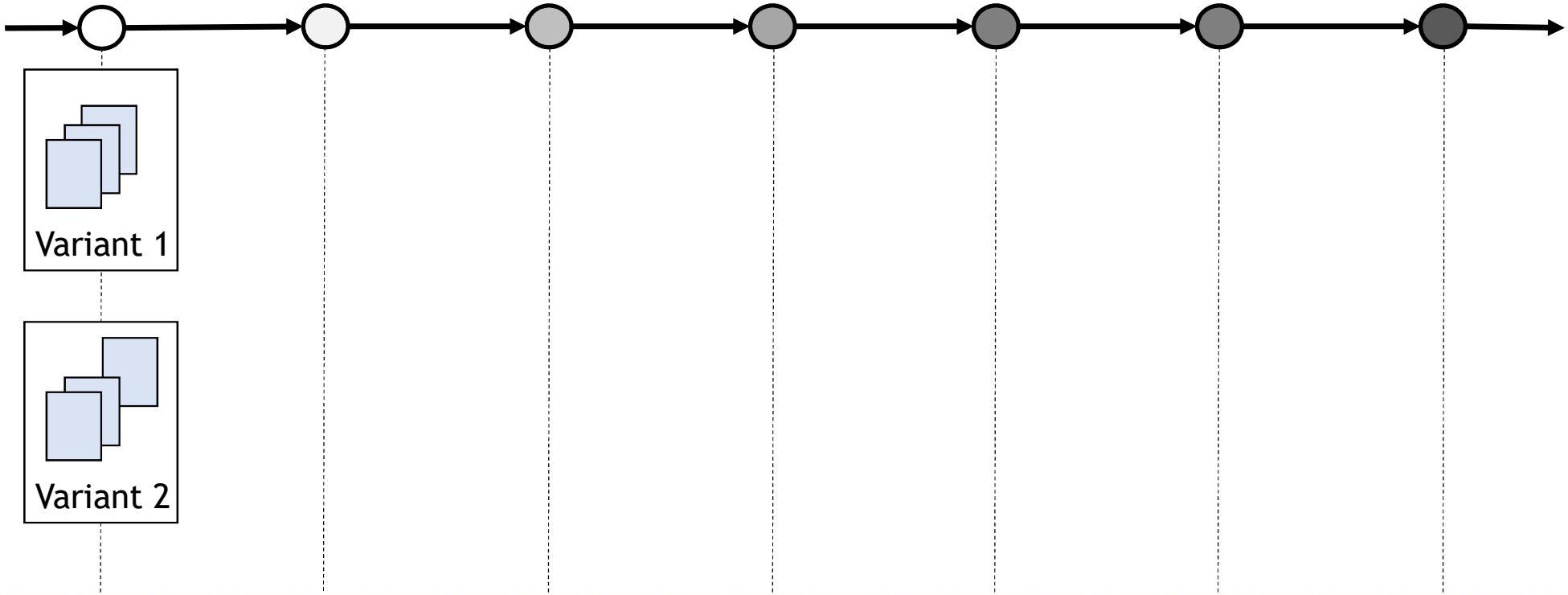

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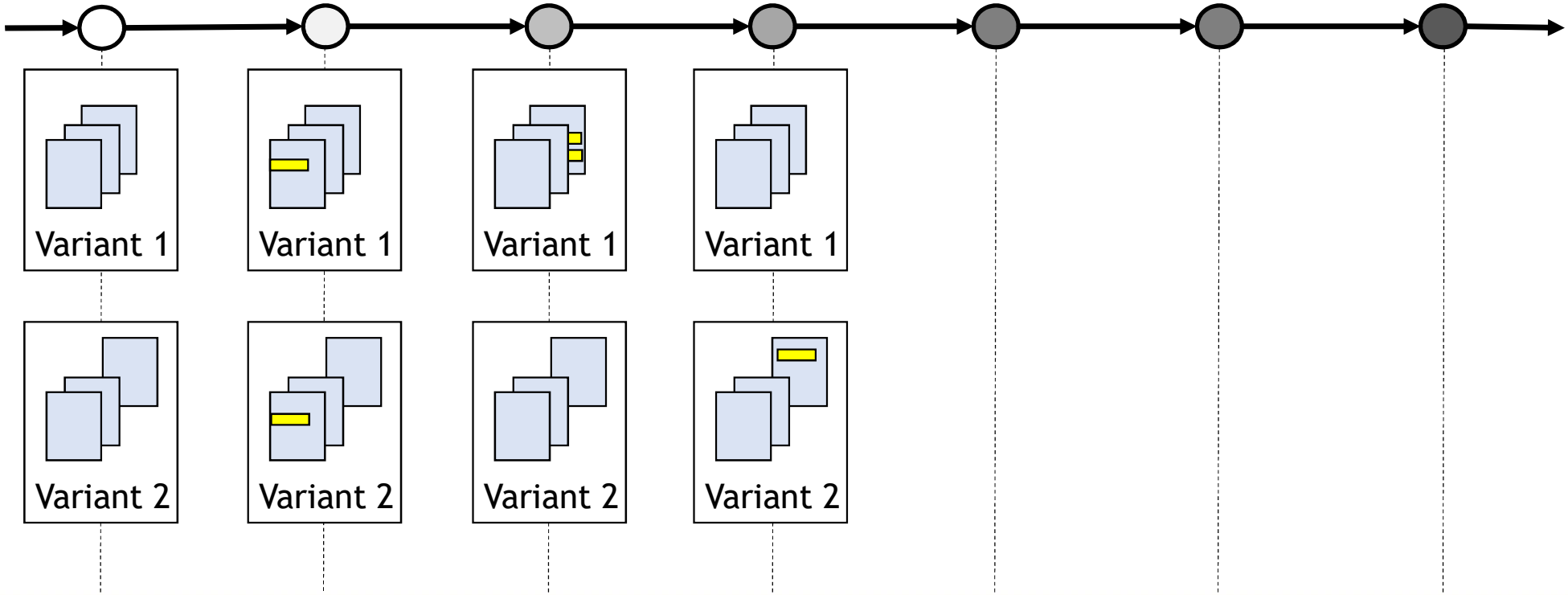

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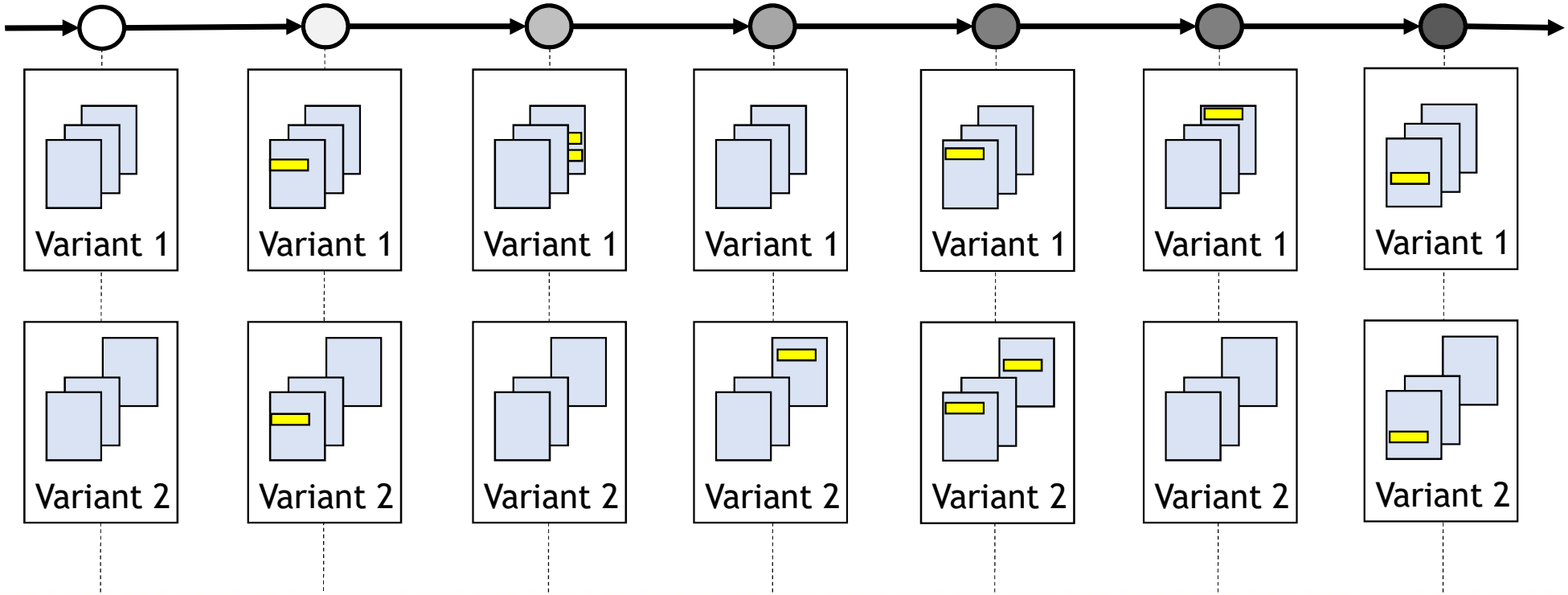
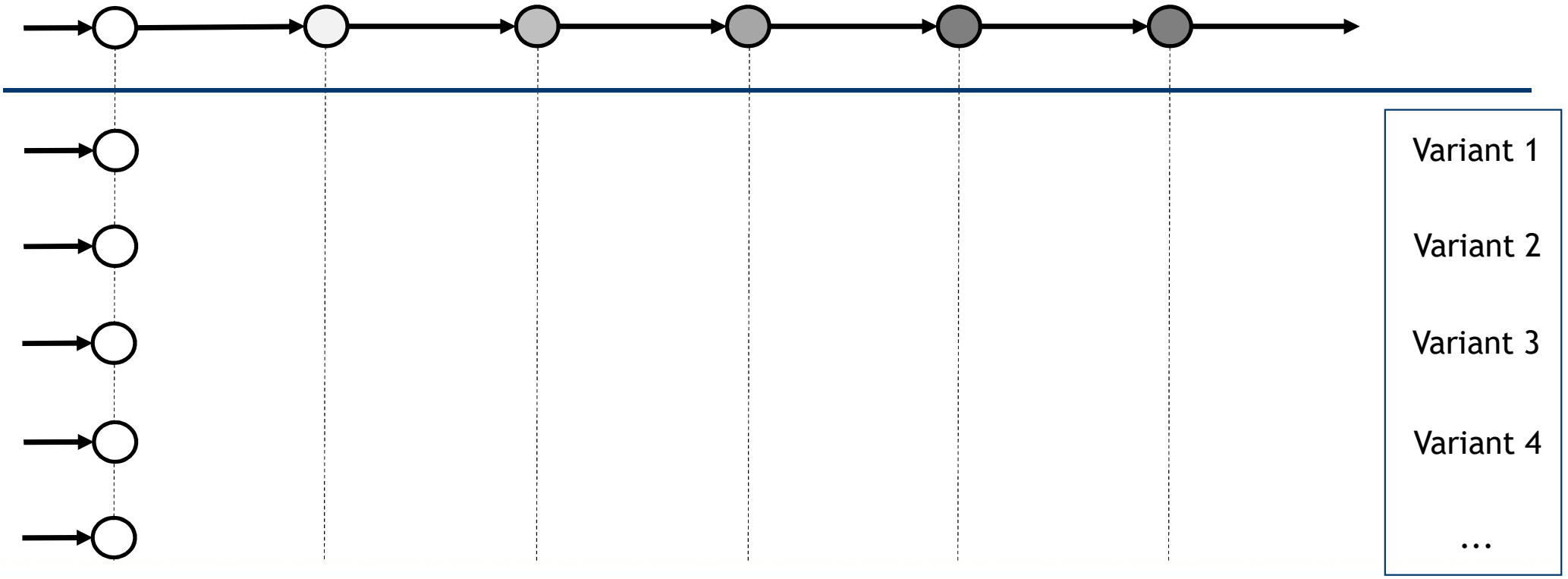


We can simulate a history



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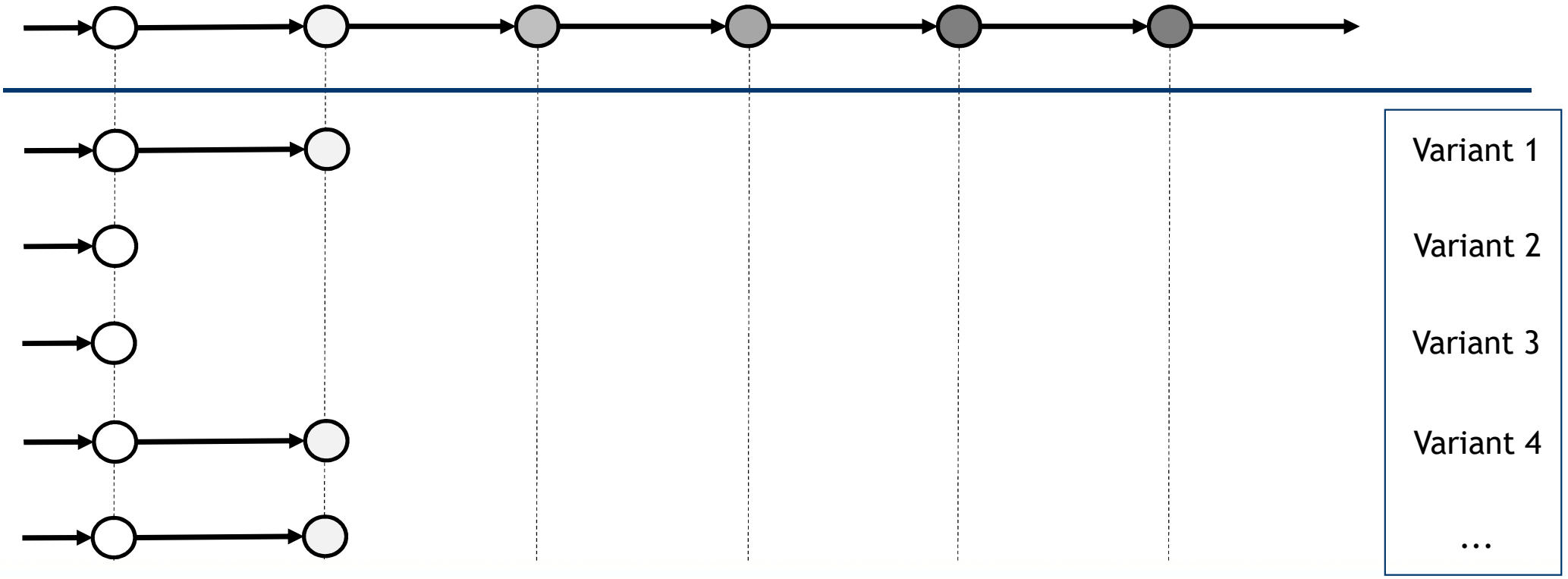

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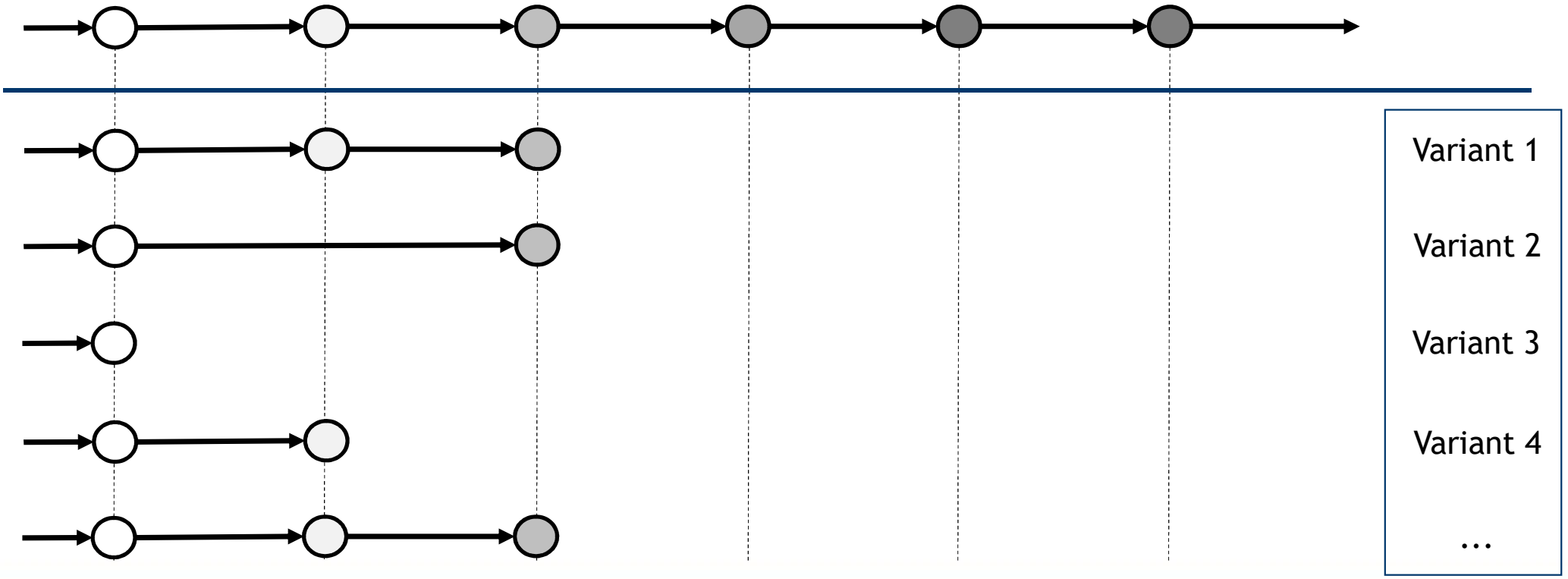

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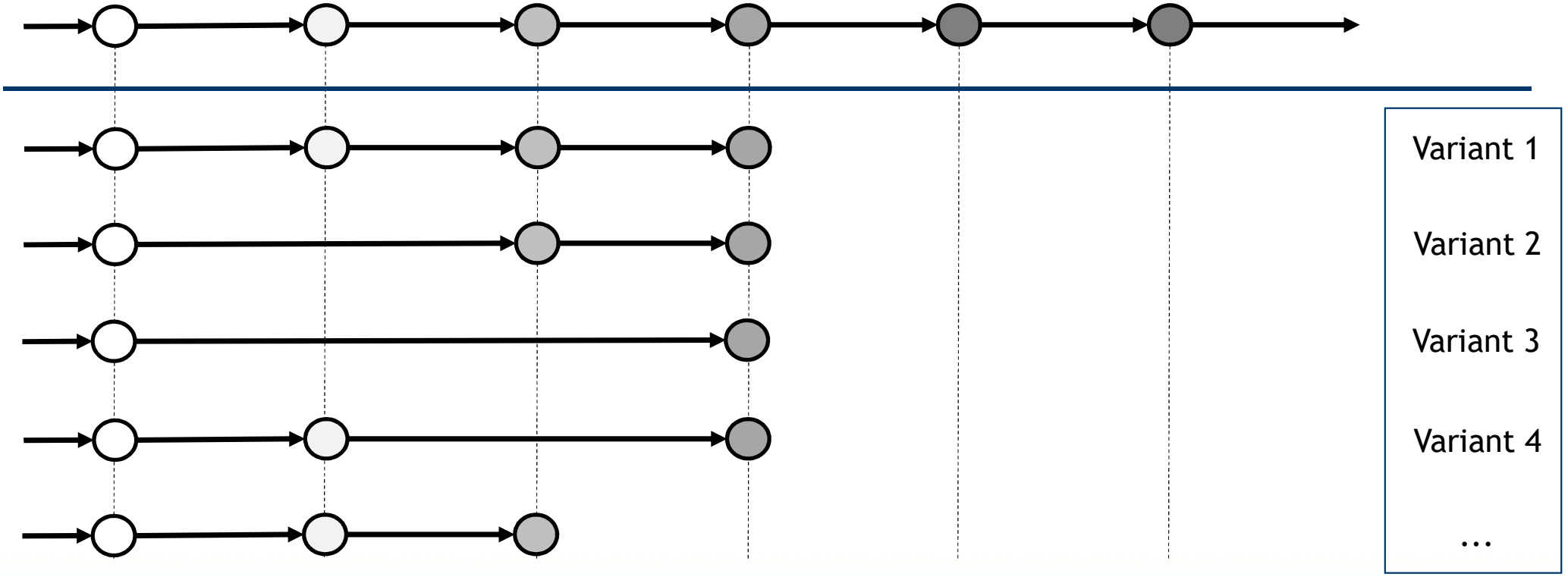

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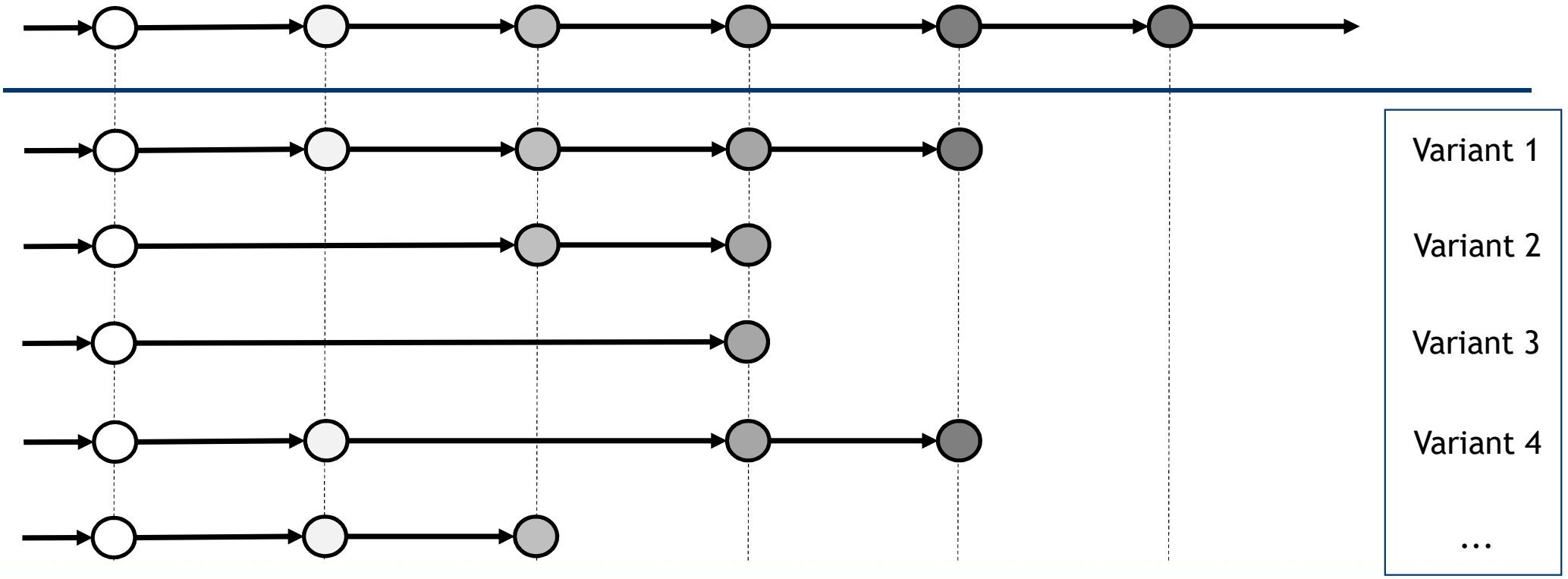

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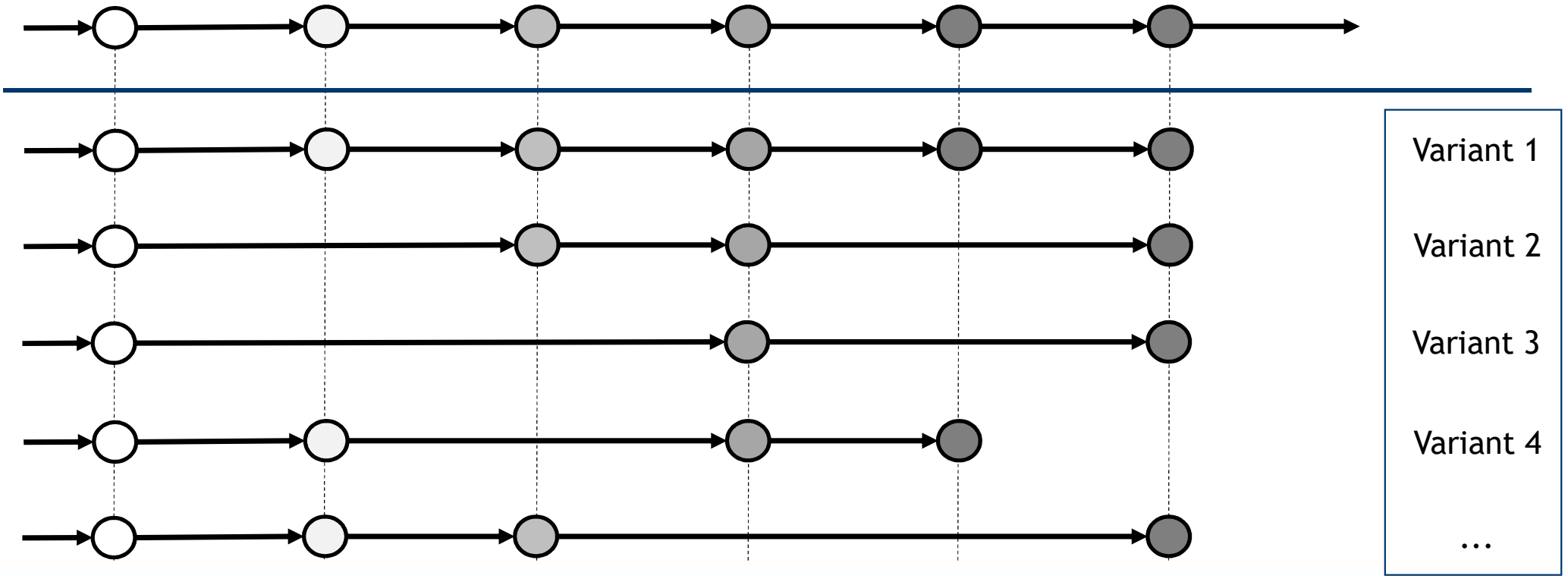

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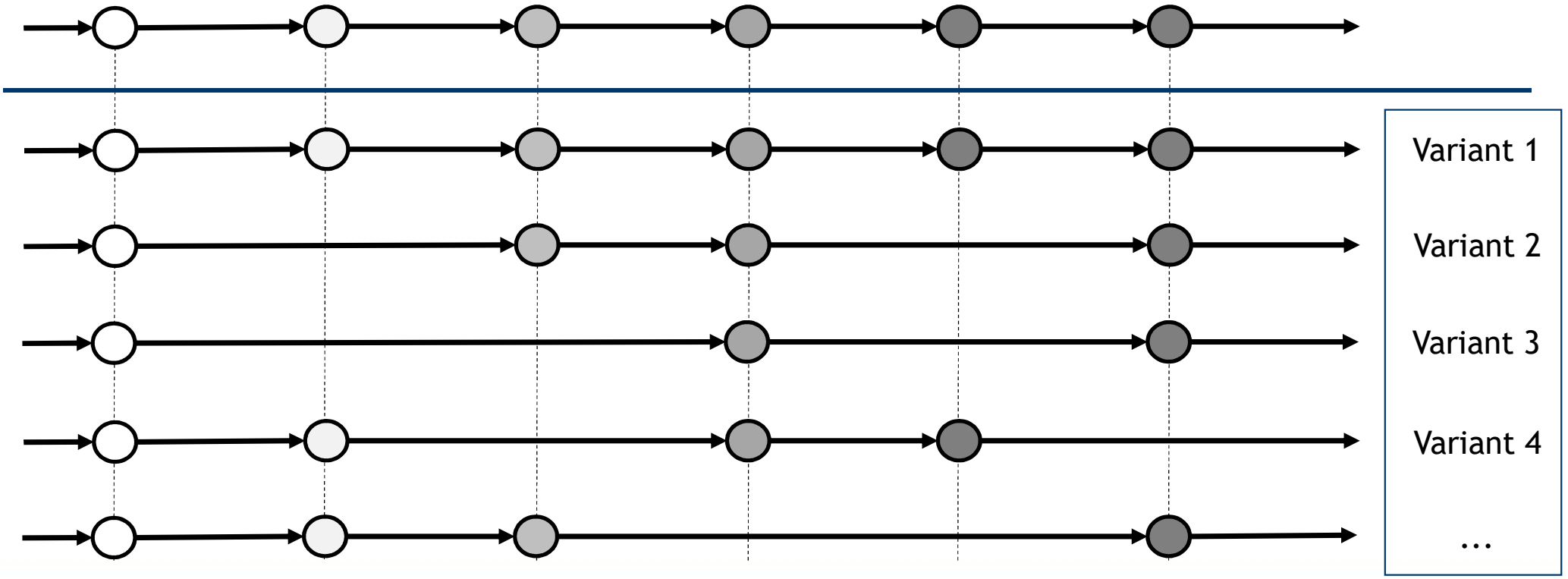
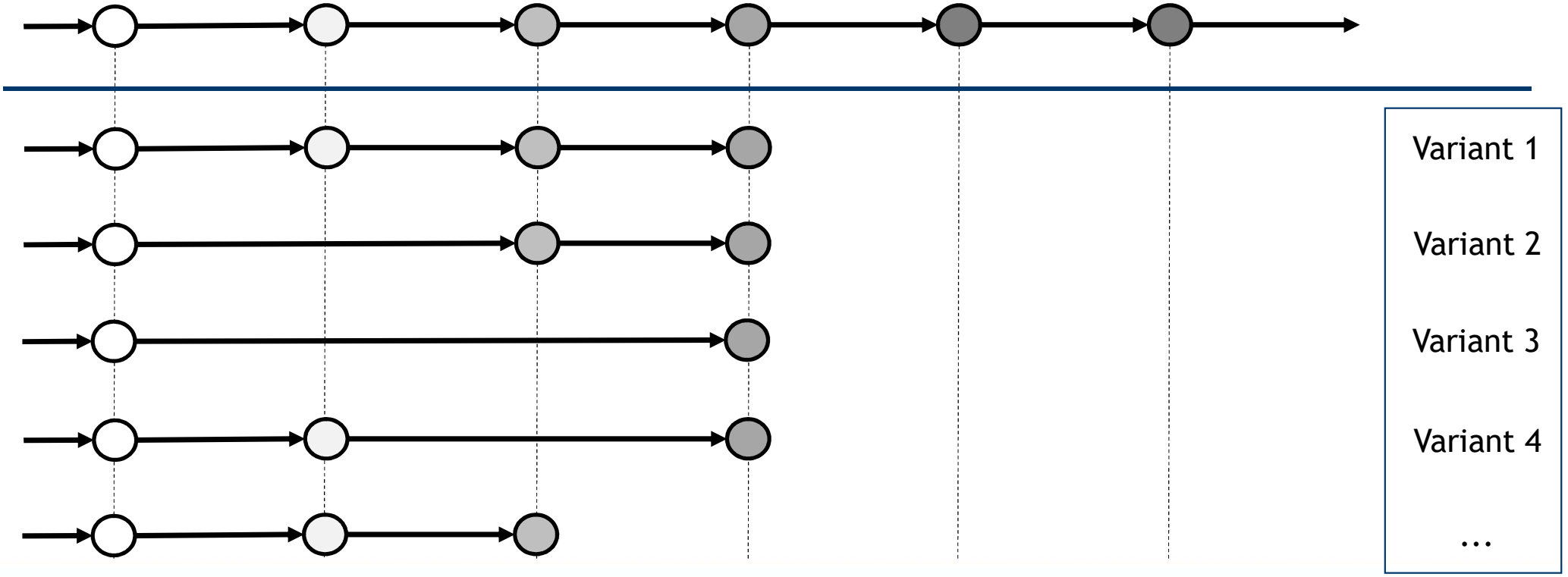


We can answer our questions



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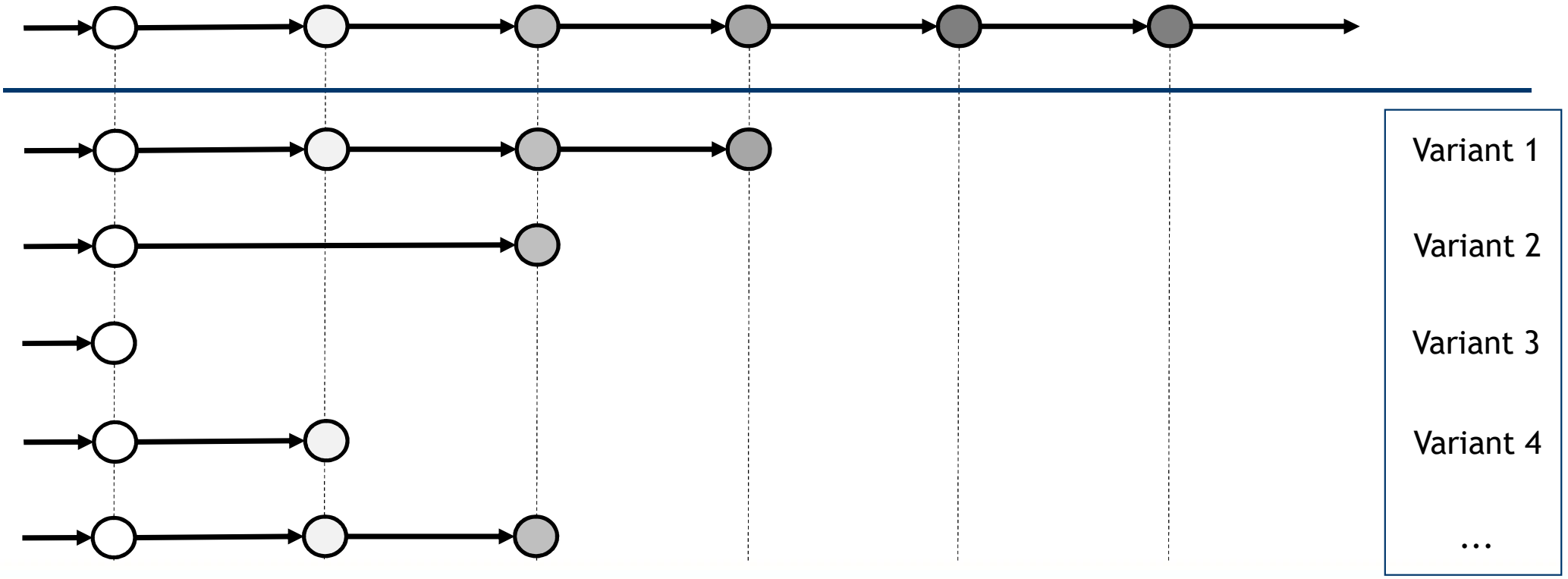

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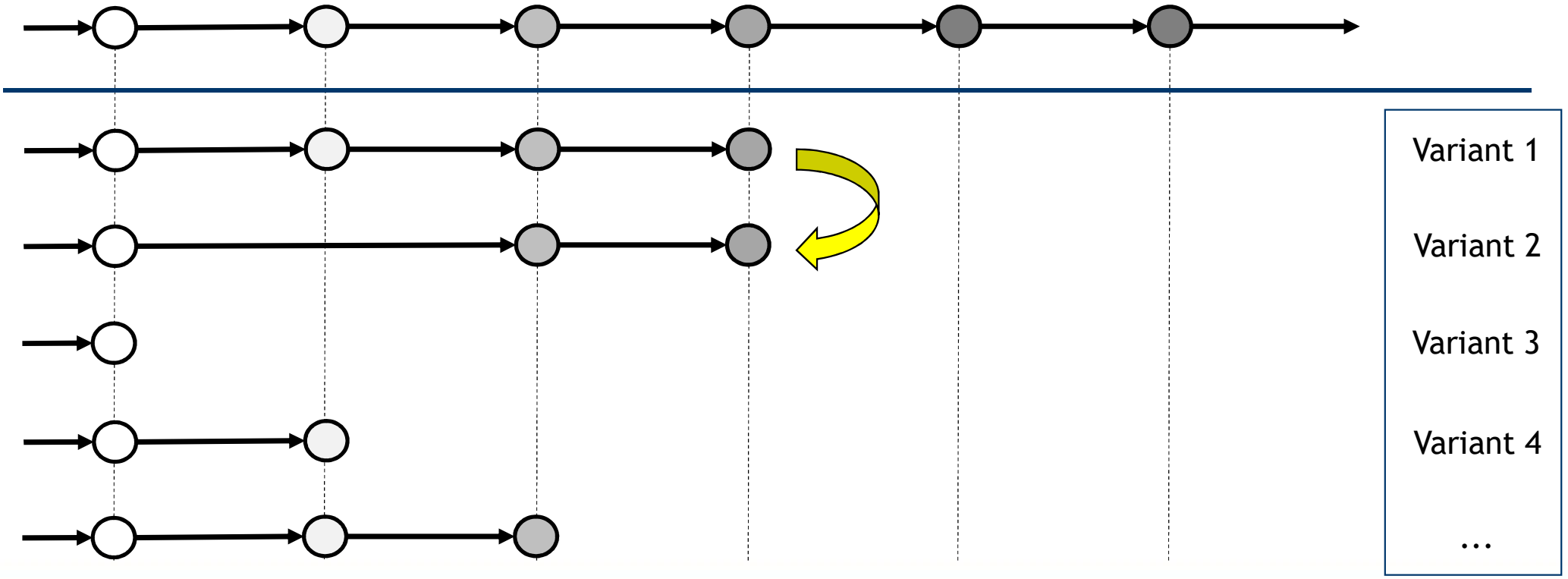
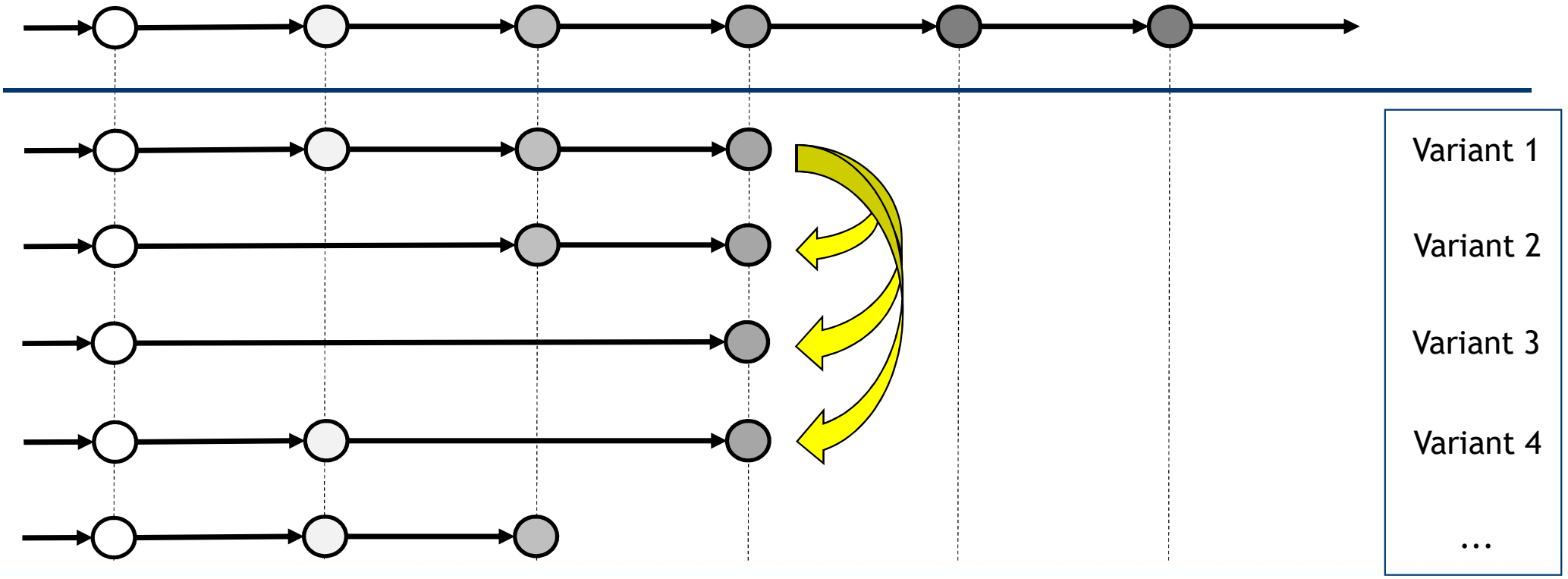
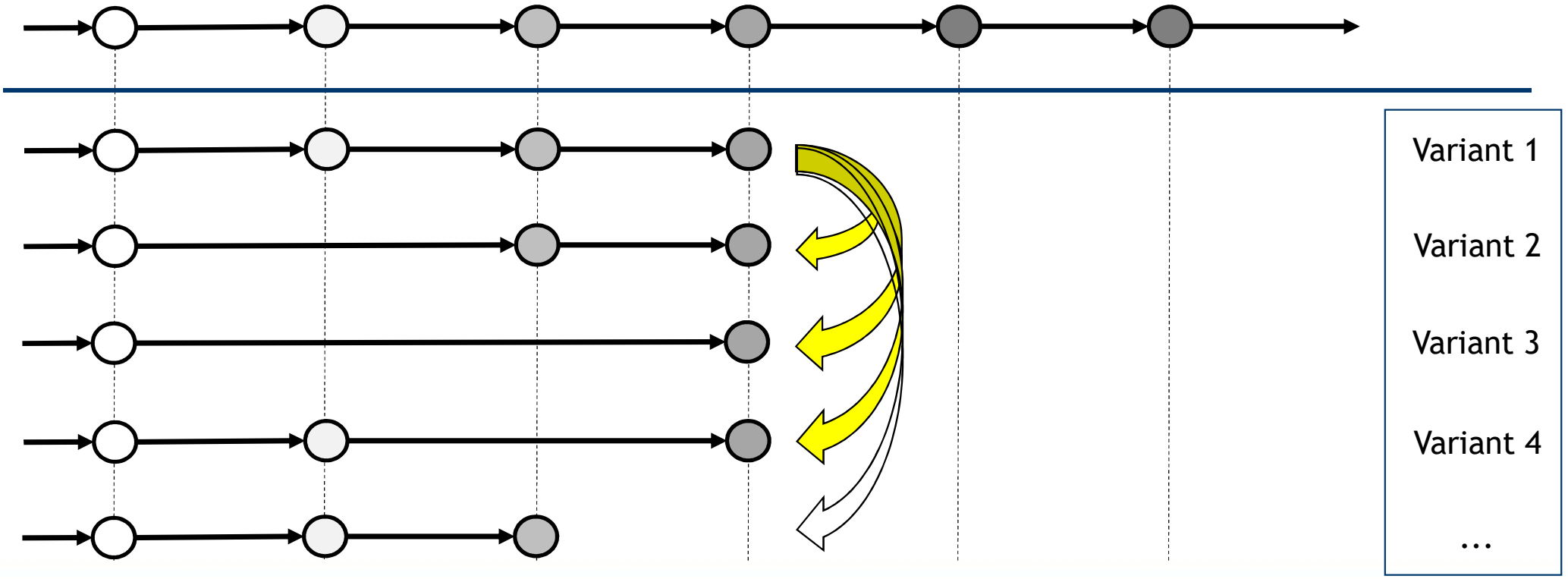


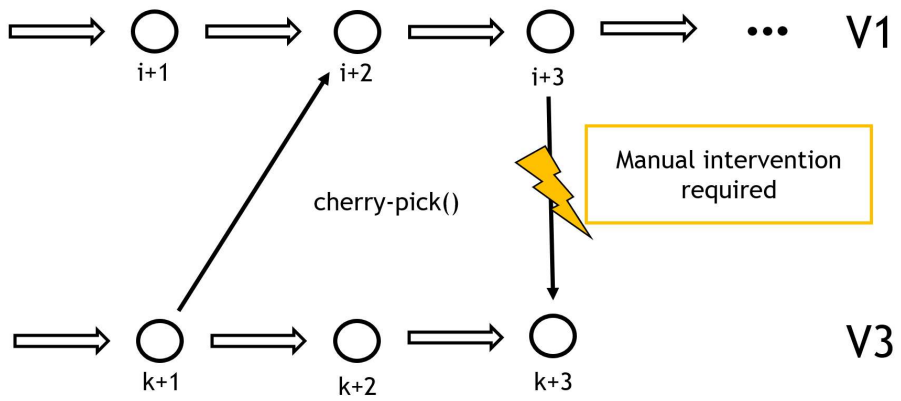
We can answer our questions



We can answer our questions



In summary...



1. Applicability of commit-sized patches
2. Applicability of edit-sized patches
3. Applicability of required patches