Distributed Version Control

David Grellscheid

Version management

In any project, there are tedious bookkeeping tasks that need to be done:

* Backup of consistent project snapshots
* Documentation of changes
* Sharing of changes
* Distributed development by multiple people and/or in multiple locations
* Bug tracing through development history

Task automation

The bookkeeping can be done

* by hand: copy things into renamed files
* locally: keep versions in a DB of some form
* centrally: a server keeps the DB, clients do the work
* distributed: each client holds a full copy of the DB

Tool history

Only showing commonly used free/OSS tools:

* local:
  RCS (1982)

* central:
  CVS (1990), SVN (2000)

* distributed:
  Darcs (2002), Bazaar, Git, Mercurial (all 2005)

Frontends and visualization

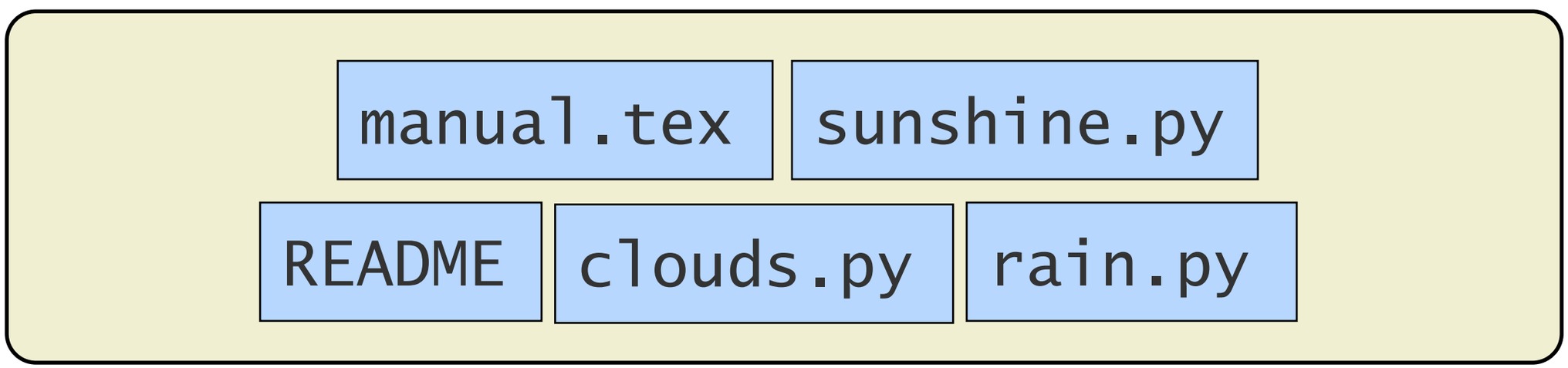
* Mercurial has built-in `hg serve`
* Many other GUI frontends available, try a few to find something you like
* Github / Bitbucket additionally give full project management tools, but keep a second repo elsewhere!

Terminology

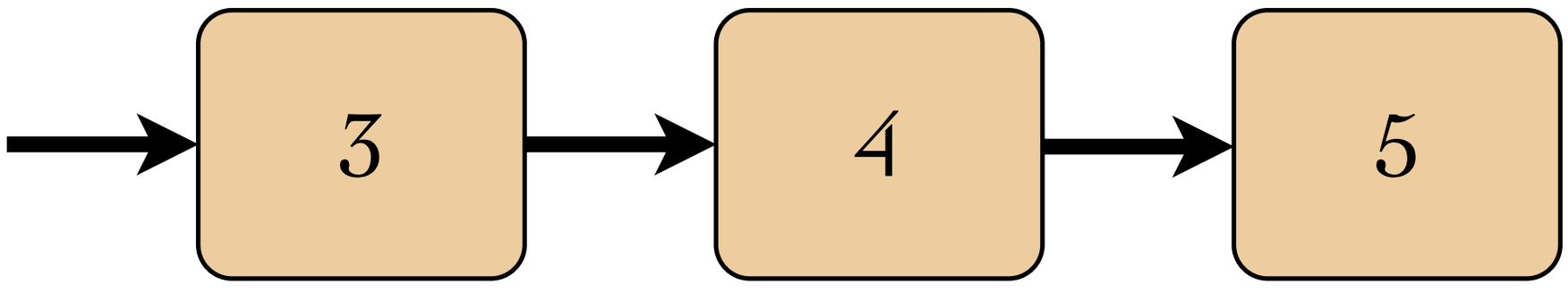
* Working copy
* Repository (local, remote)
* checkout, checkin — update, commit
* pull, push
* branch, merge

Working directory

one version of the project, visible to be edited



is based on **one** version in the repository,
usually the last one



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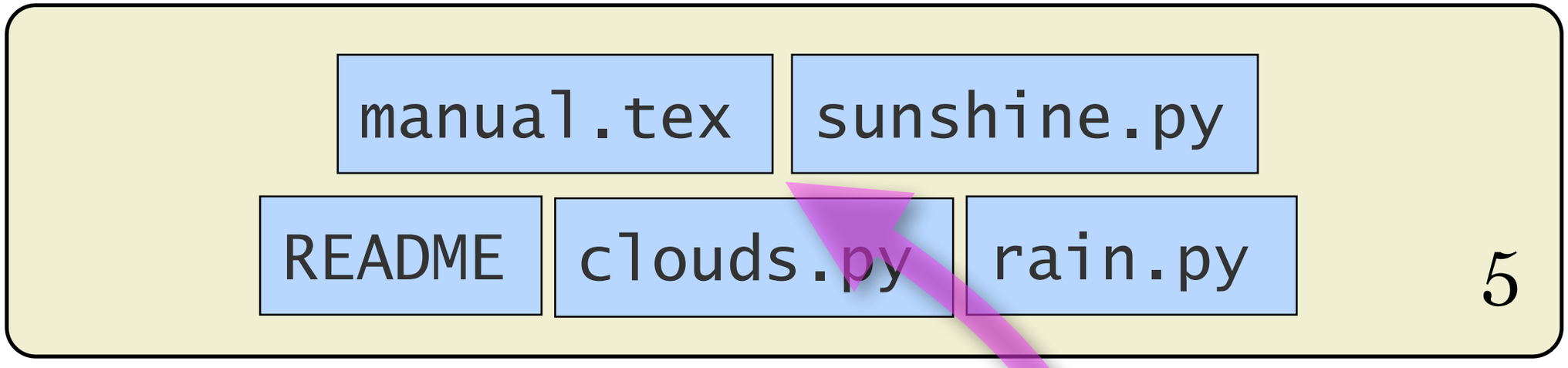

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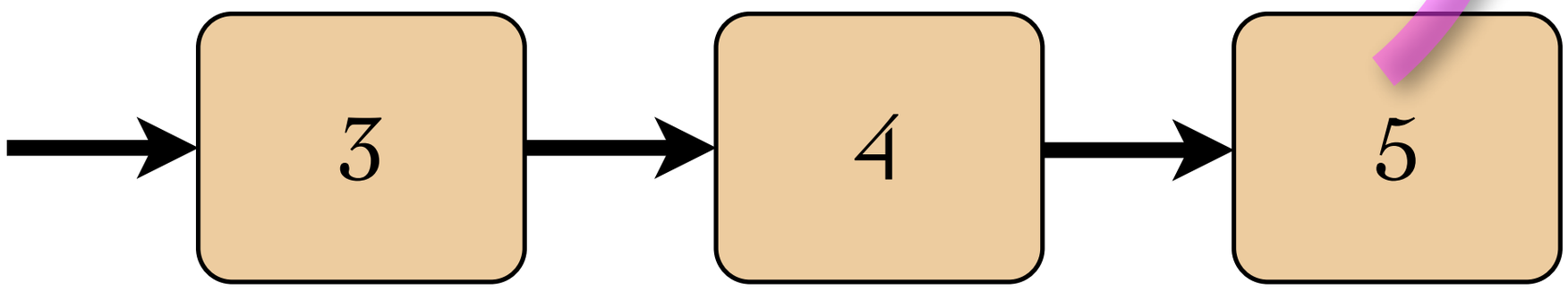

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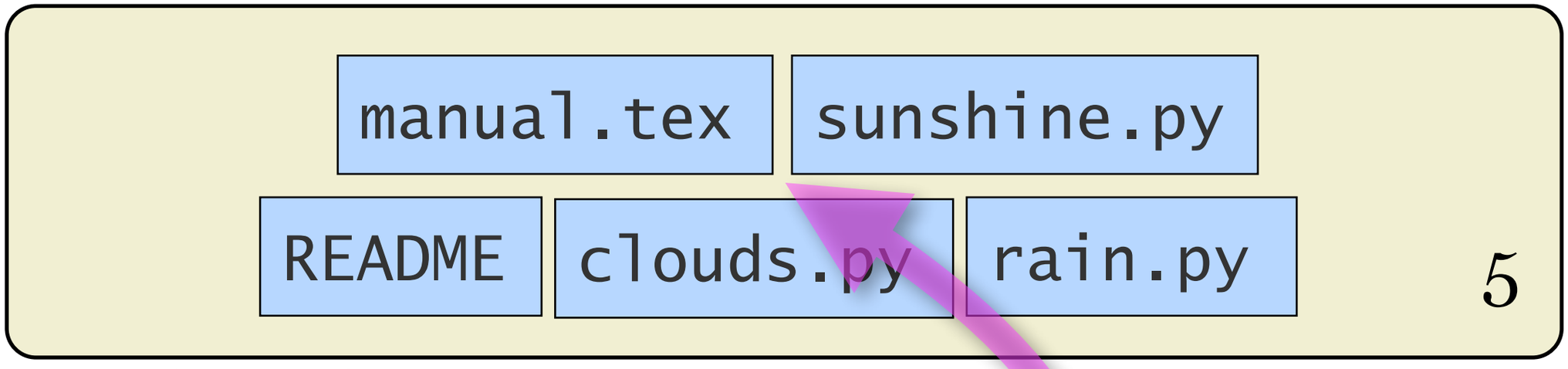

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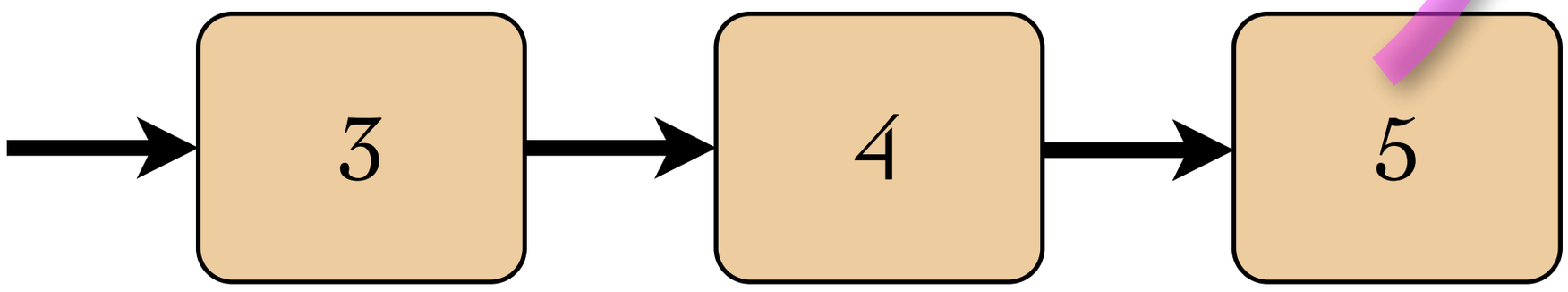
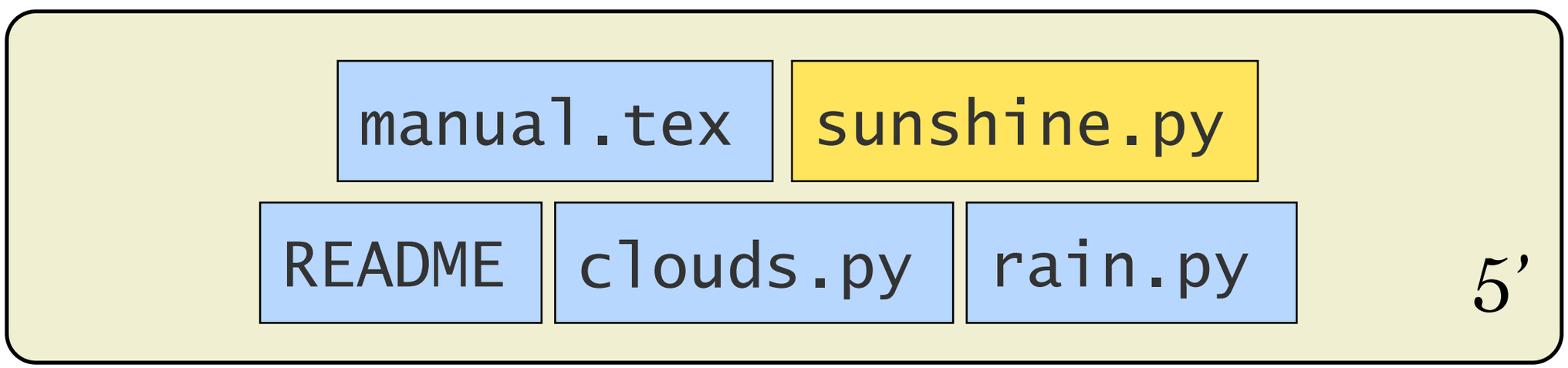


each WD has its own copy of the full repository!

Changes

working copy can be changed as usual



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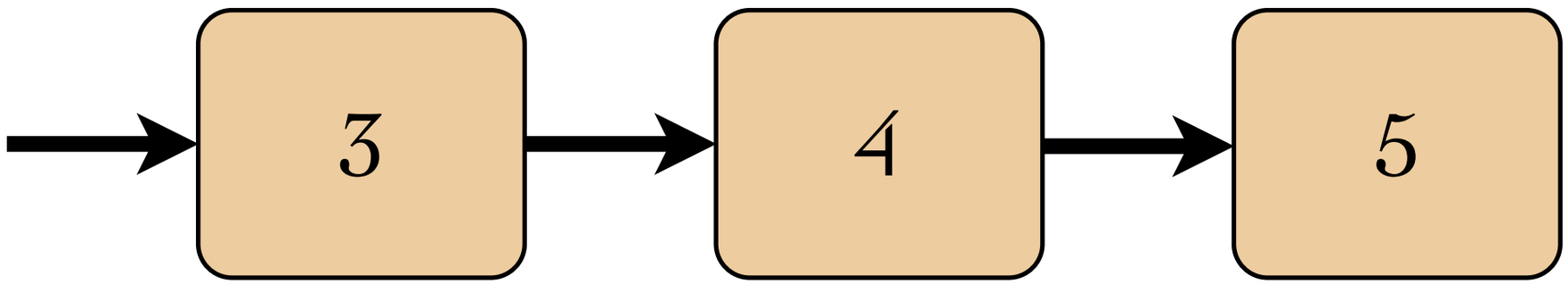

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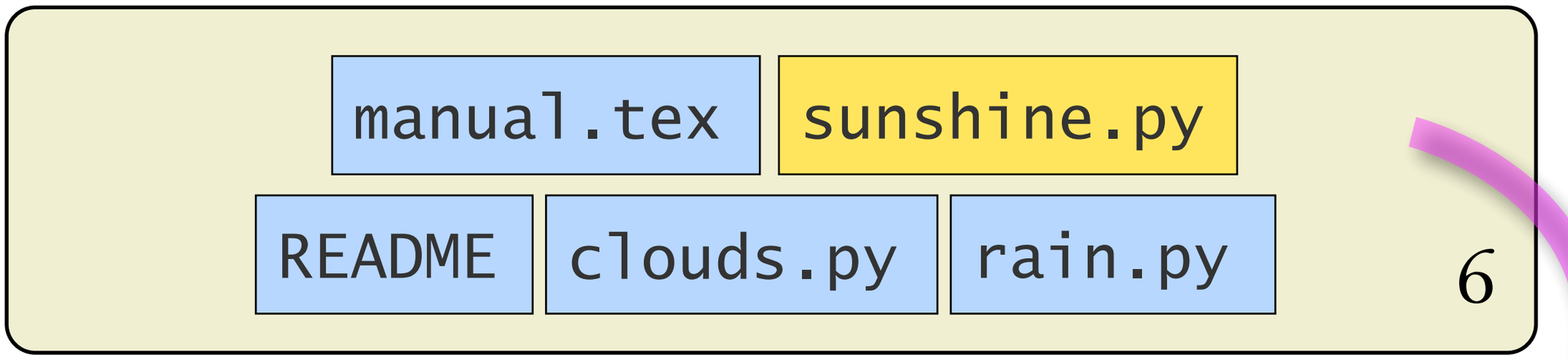

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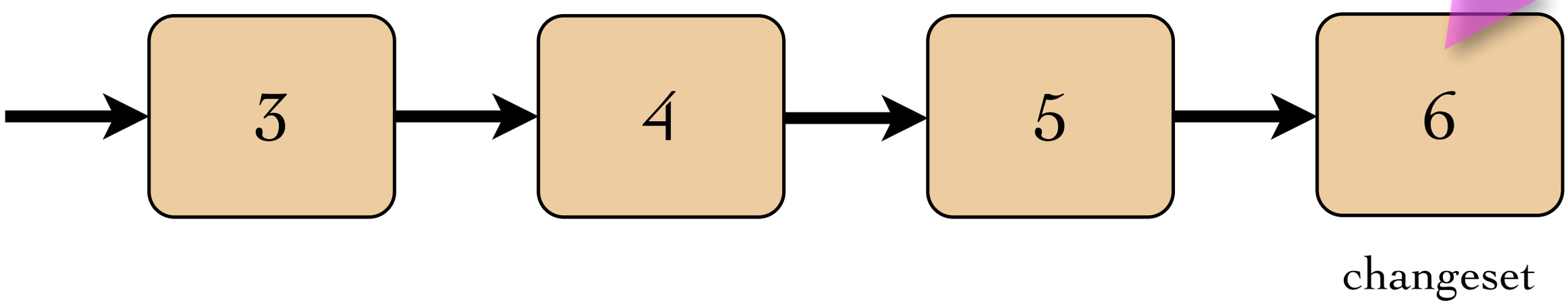
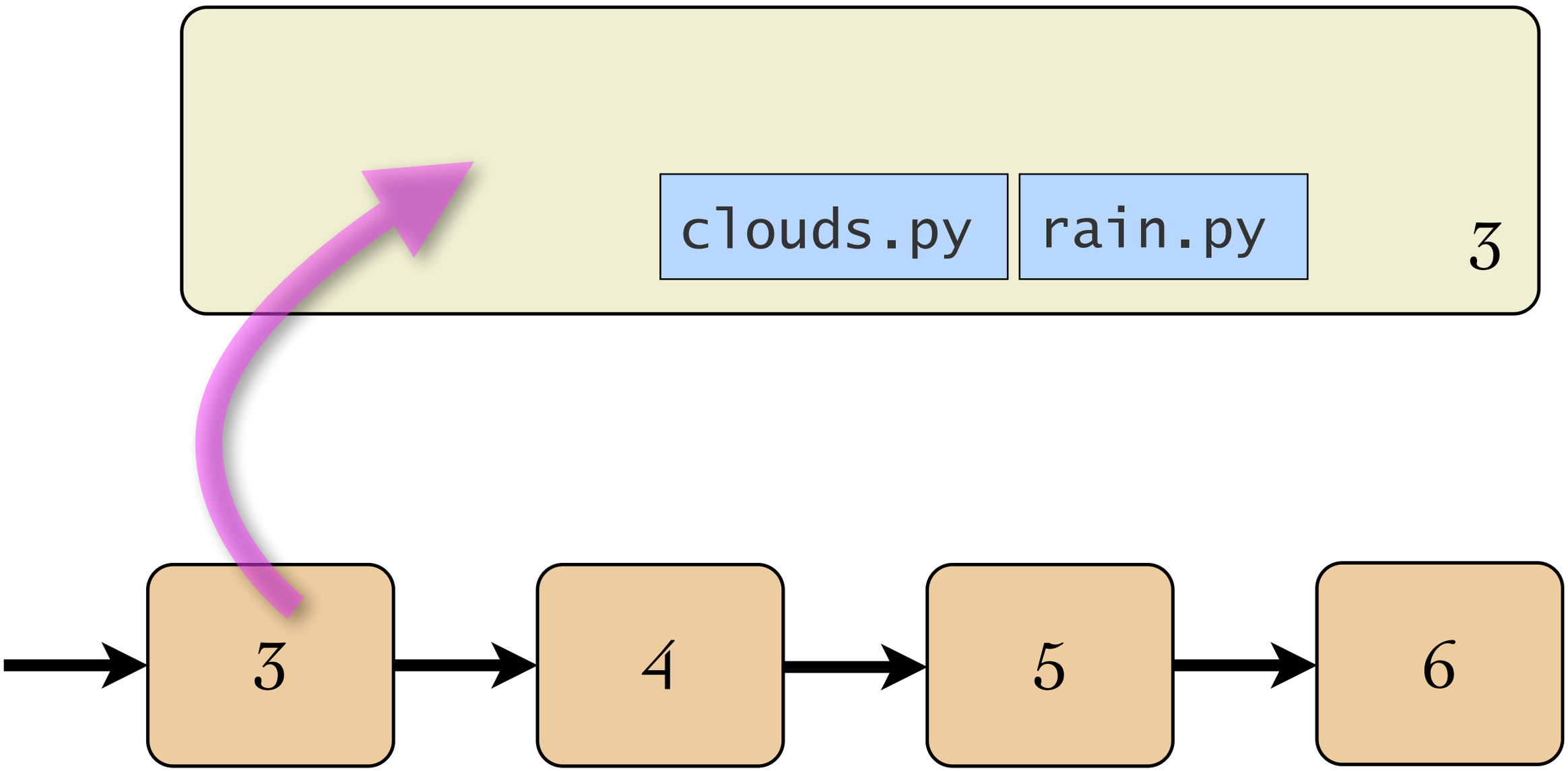


changeset

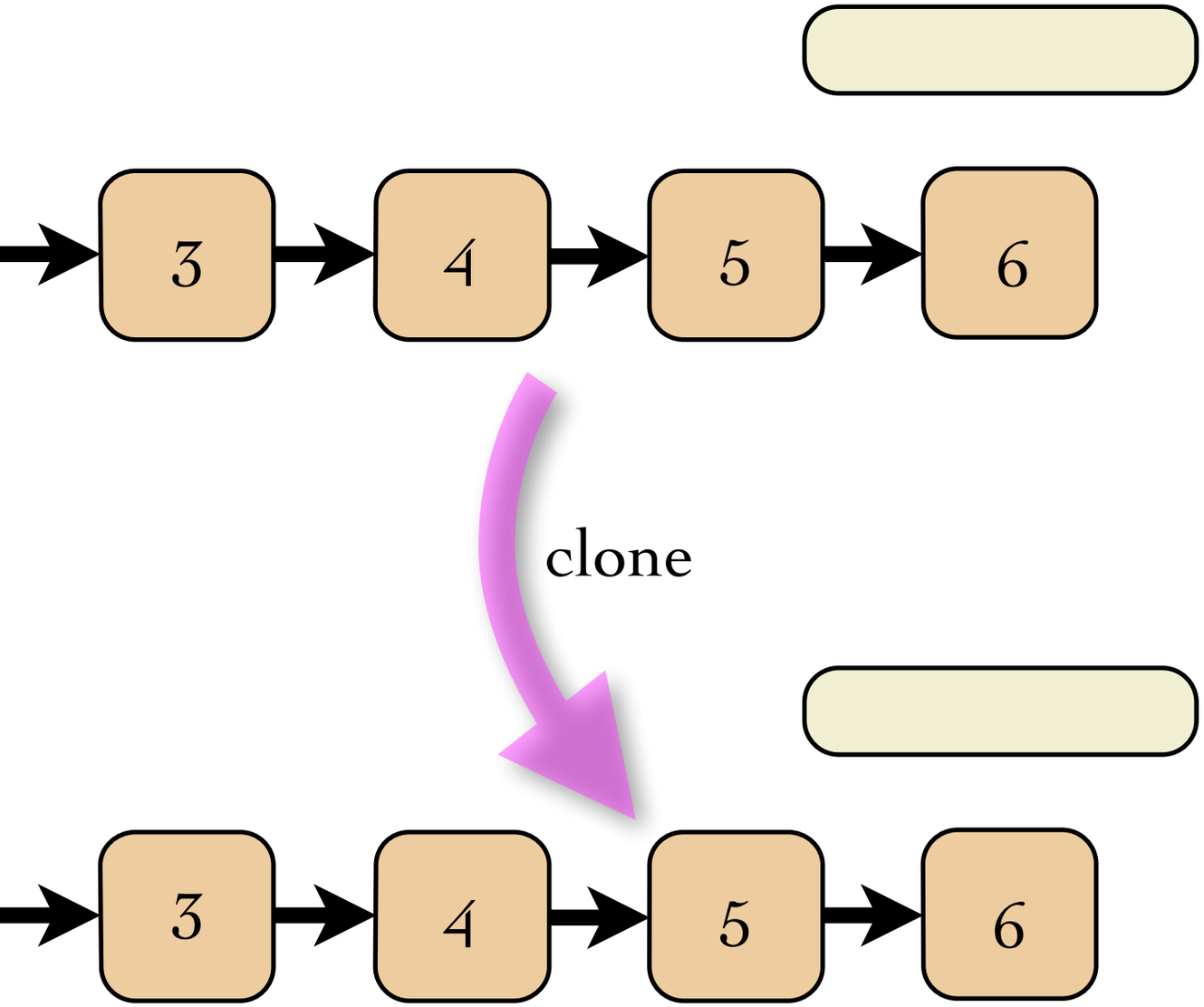
Backtracking

older versions can be looked at at any time



Remote work

clone repositories to other locations / devices / people



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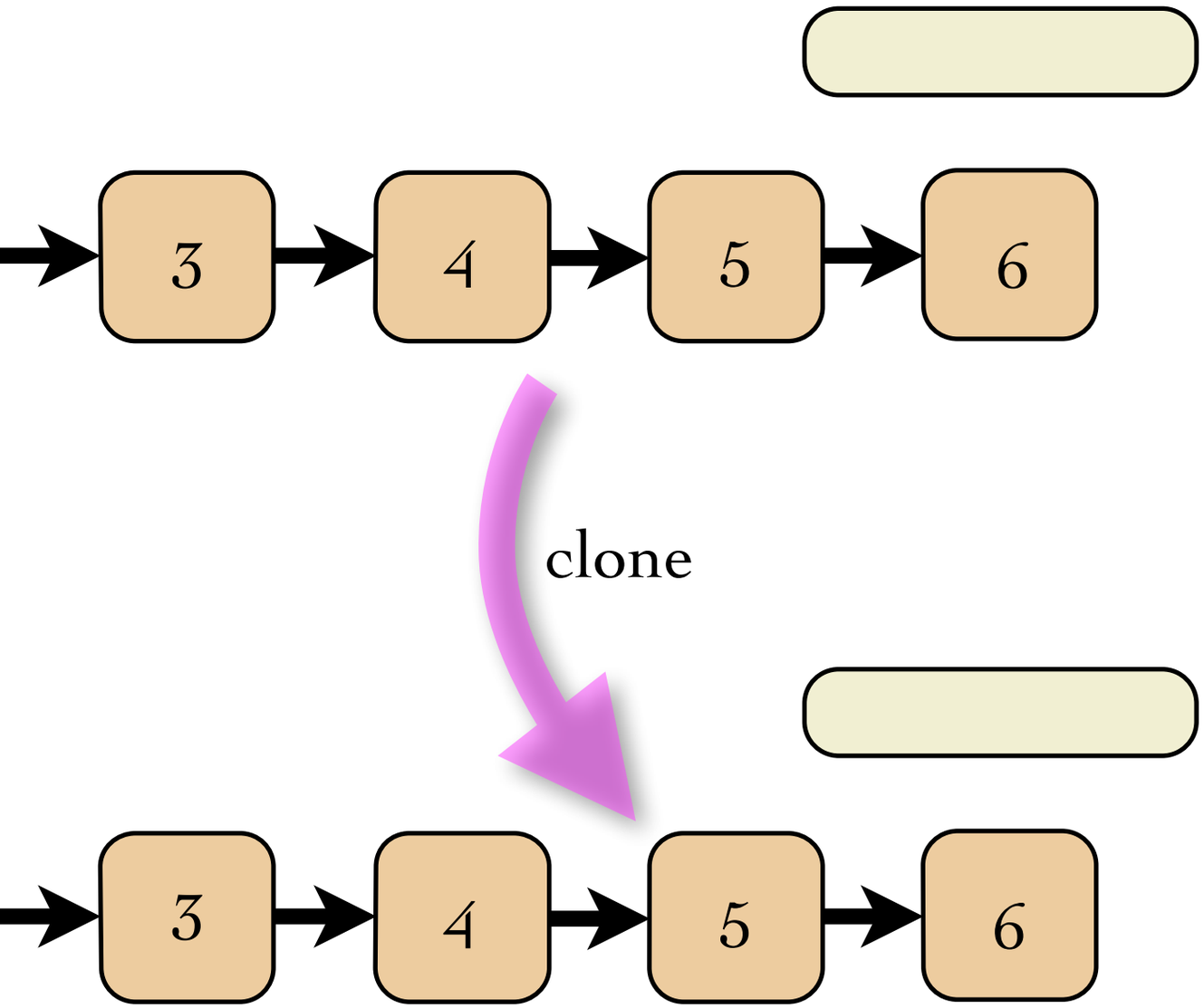
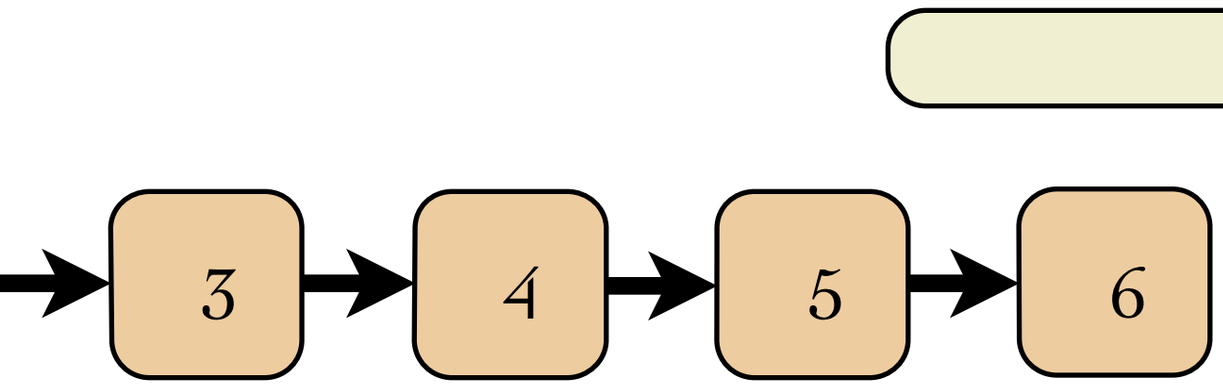
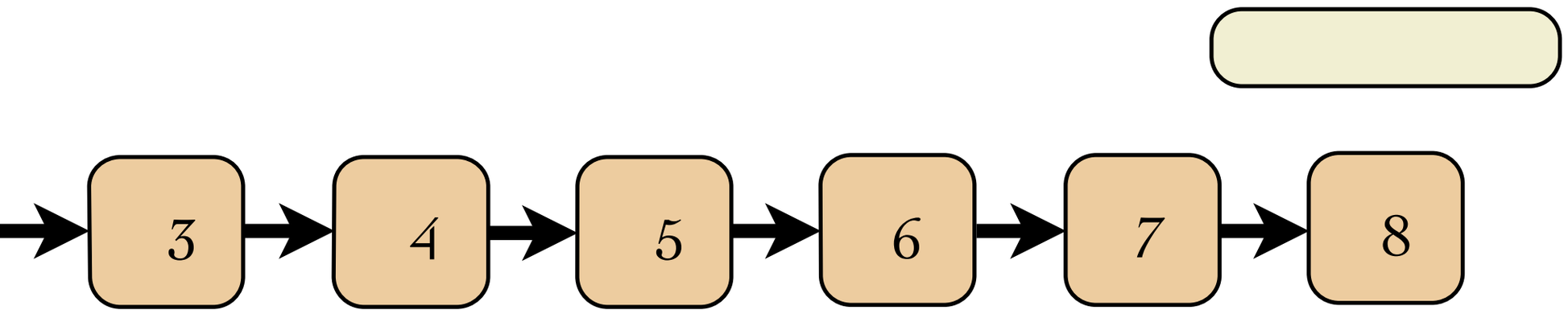


each clone has all features,
not distinguishable

Remote work

development can happen anywhere





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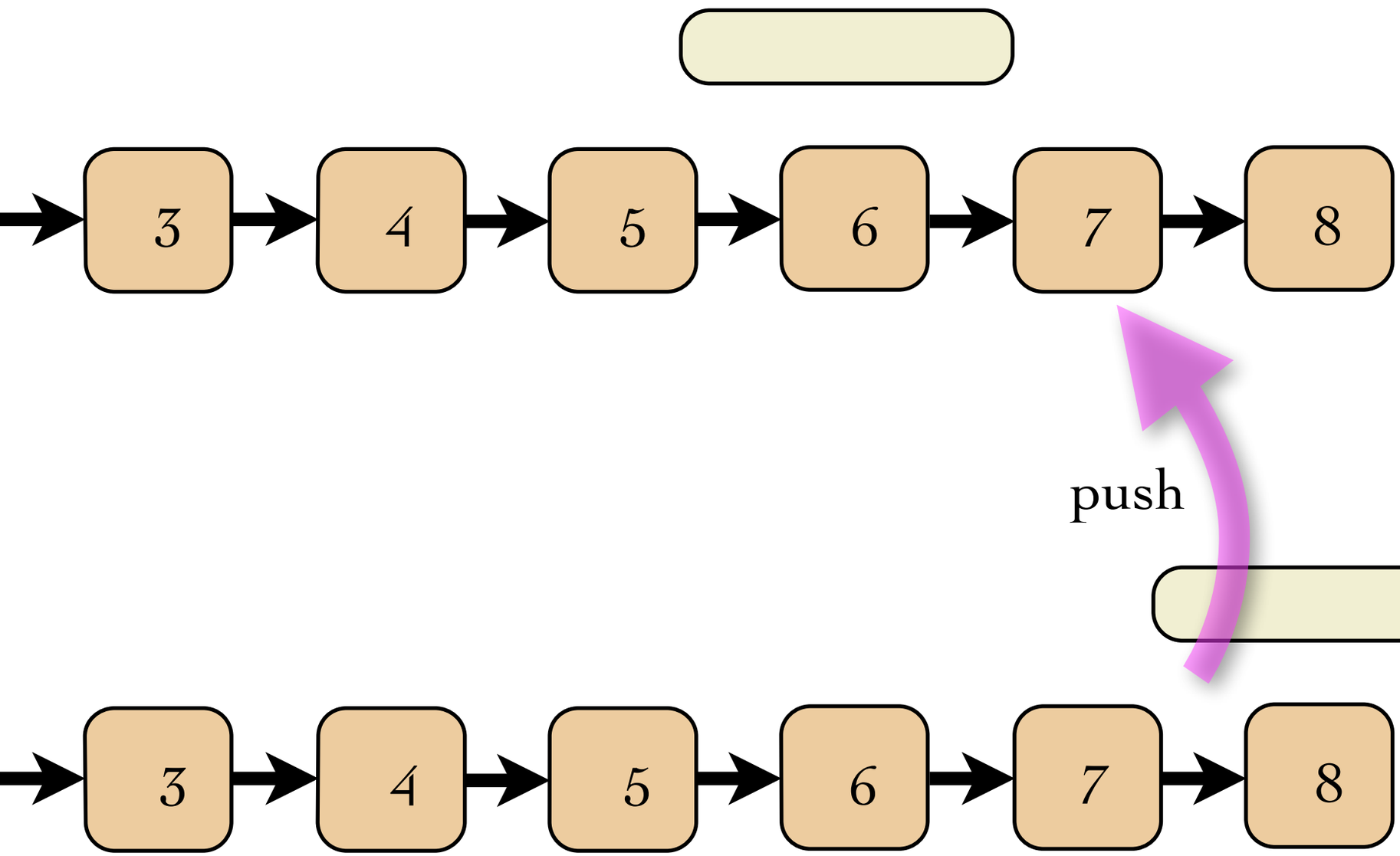

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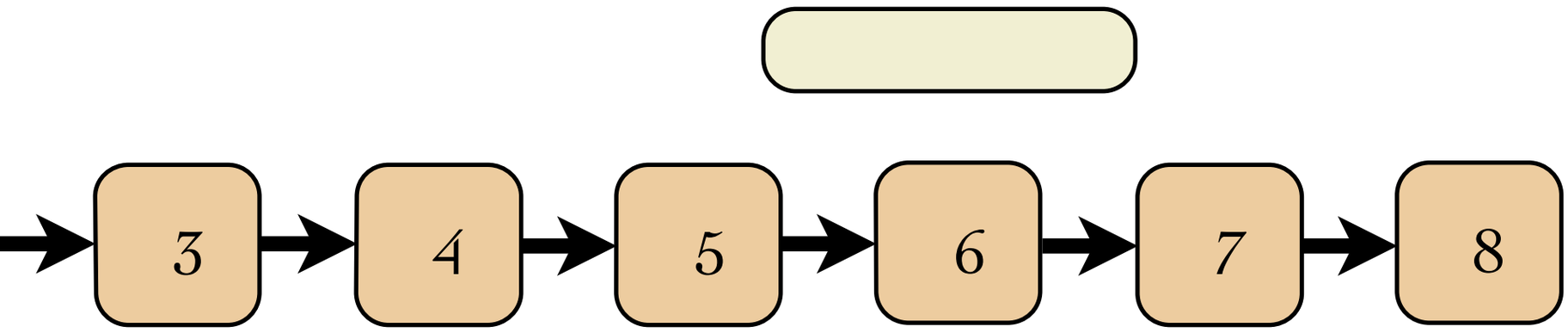

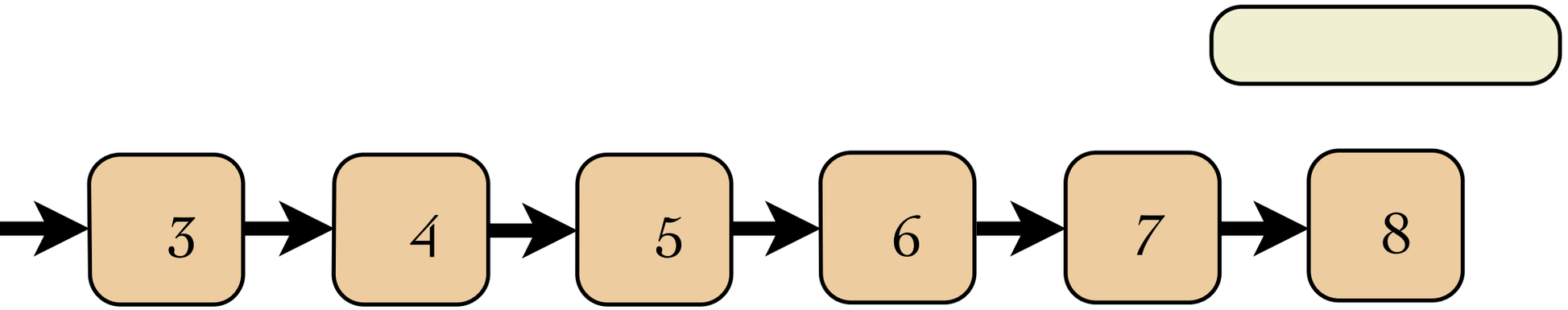

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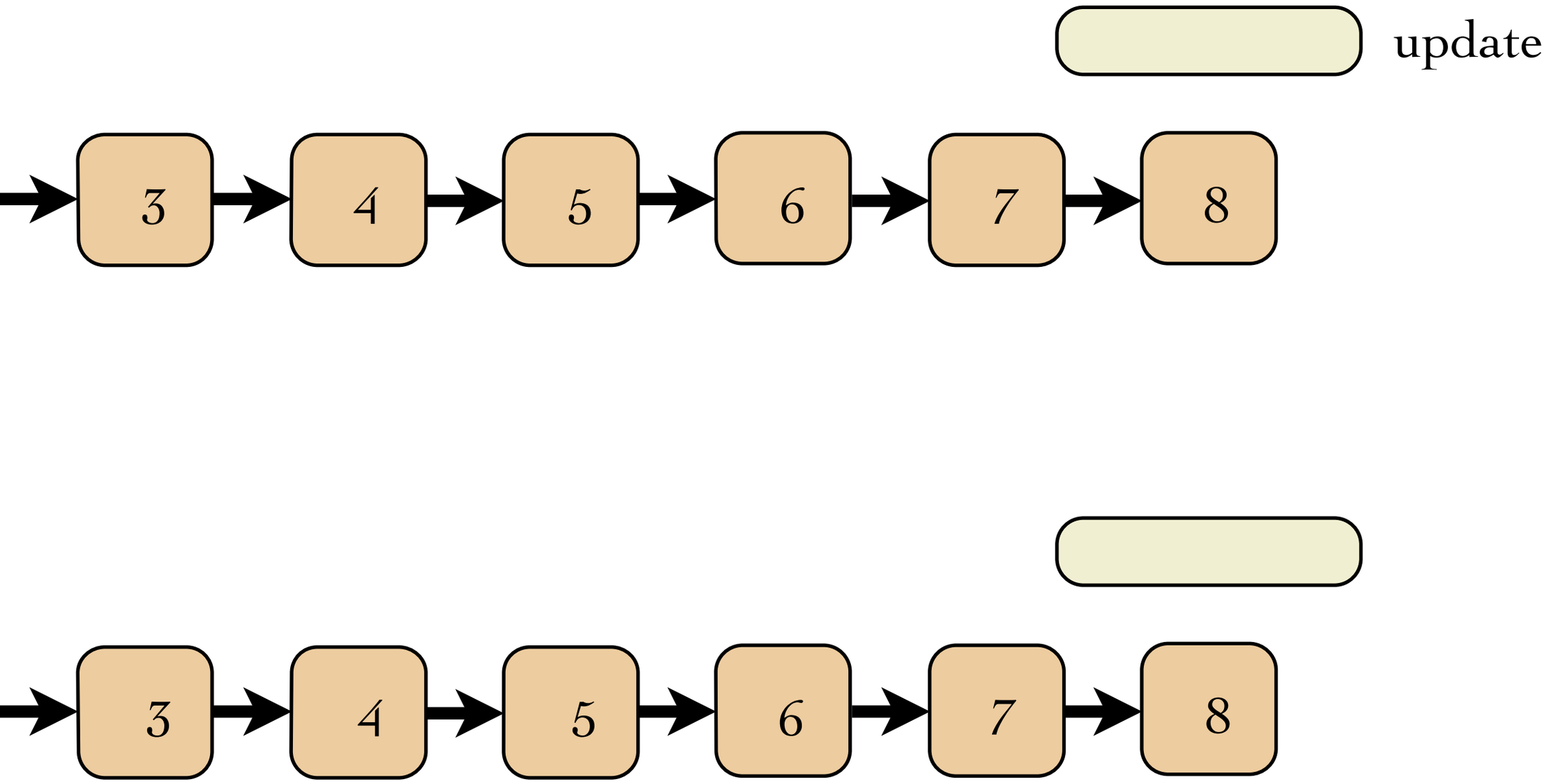

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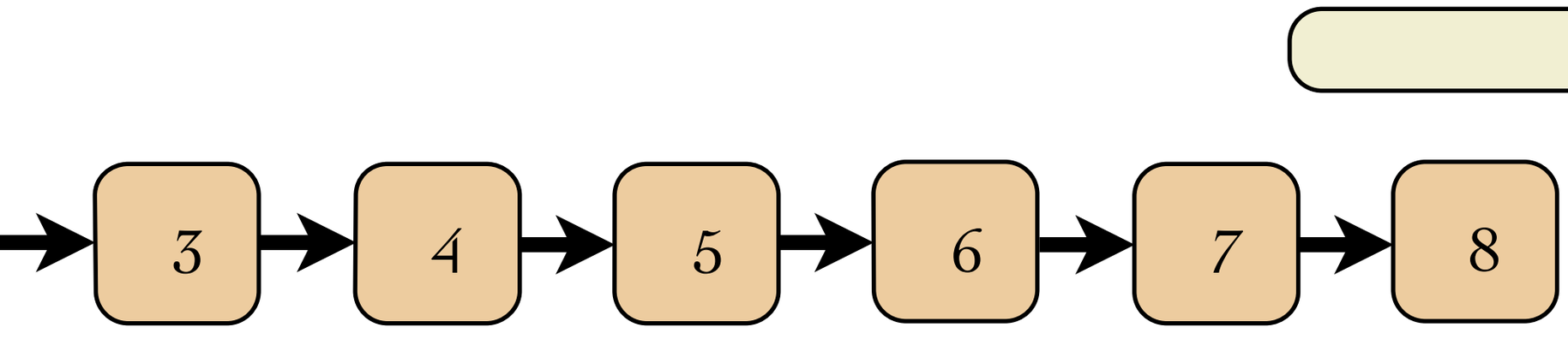
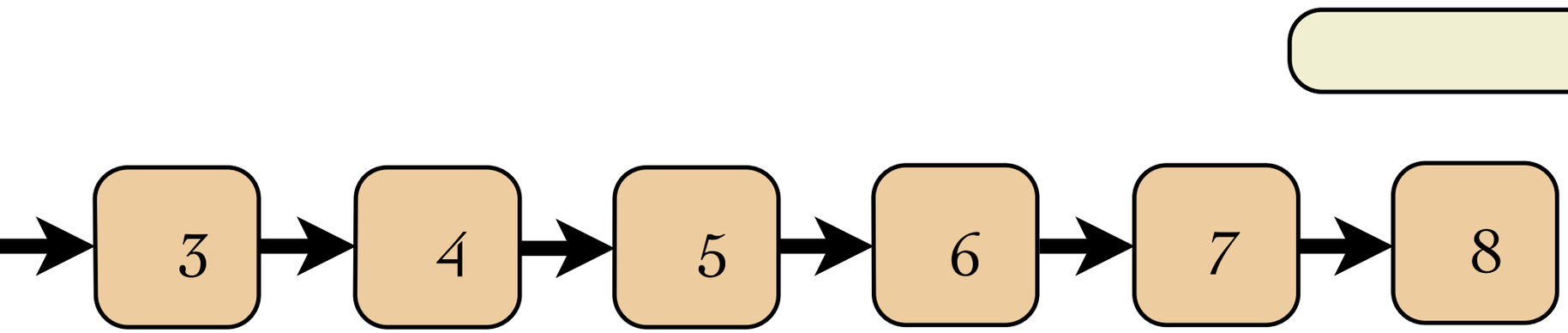
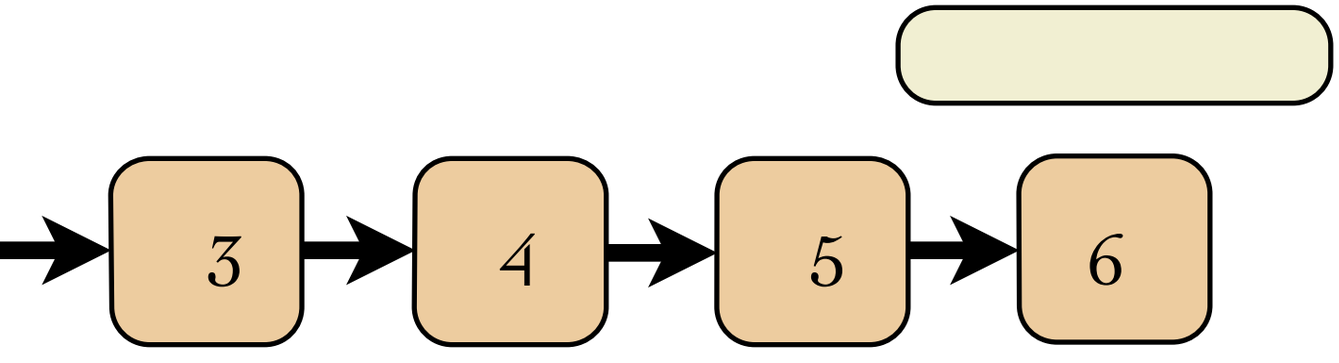
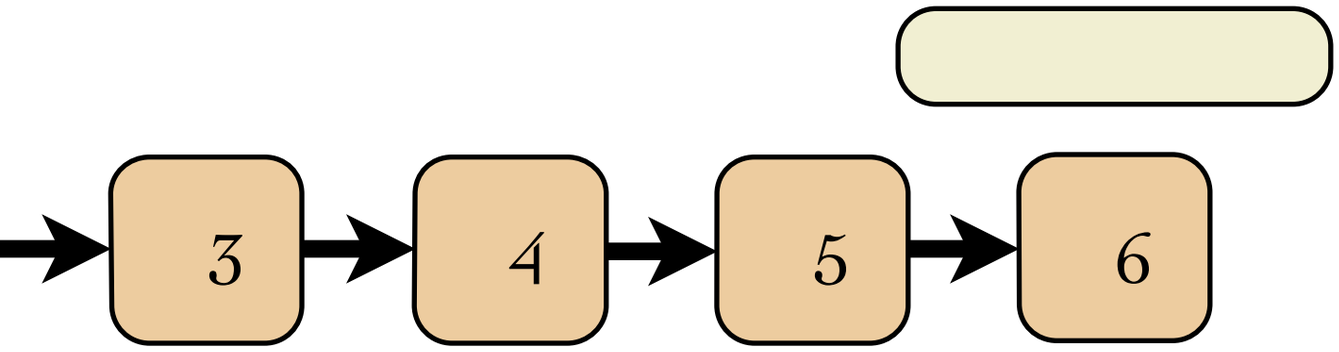




Branches

unlike in SVN, branches are a natural feature





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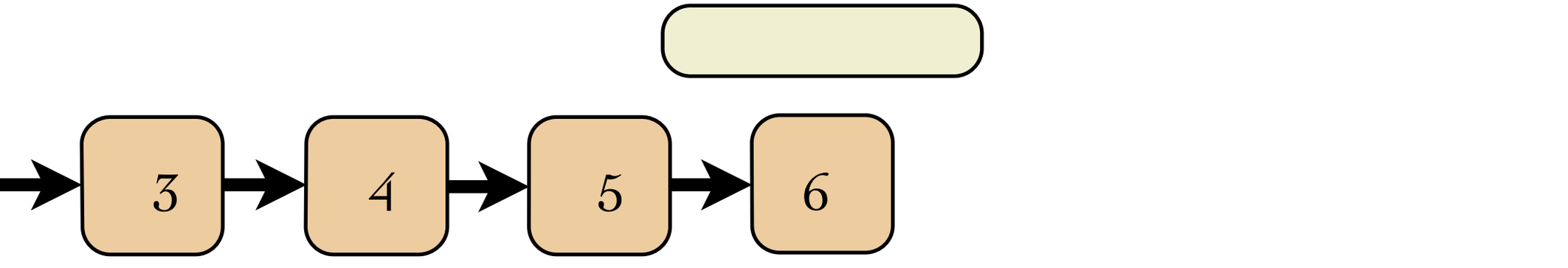

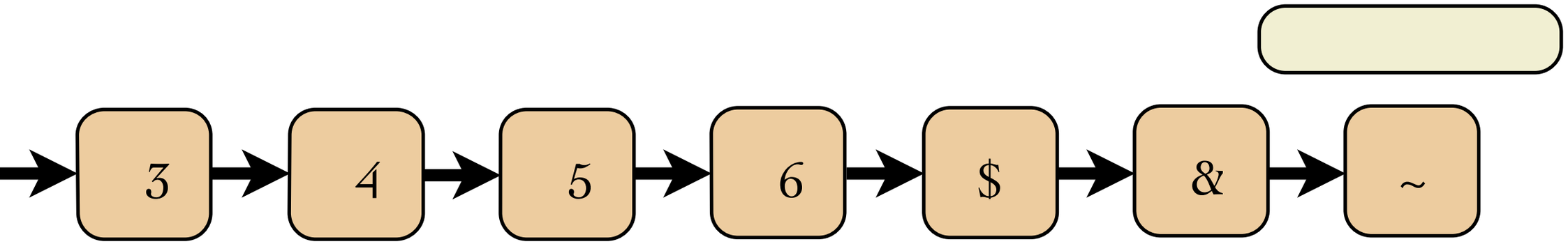

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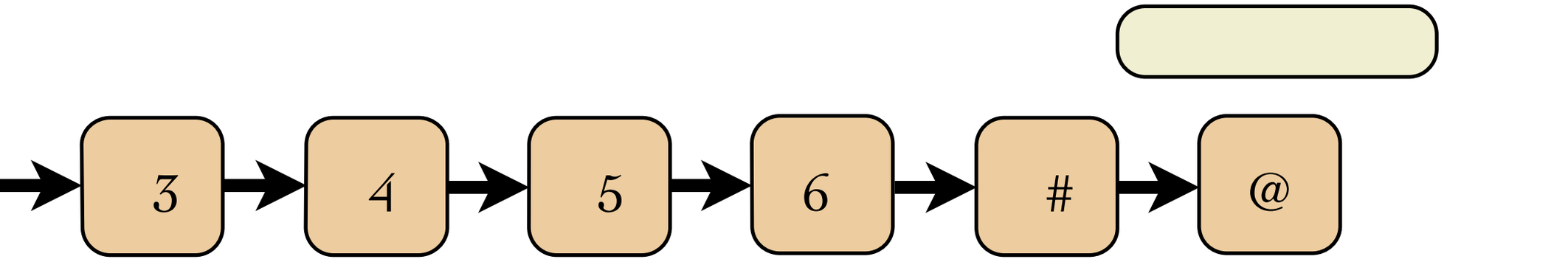

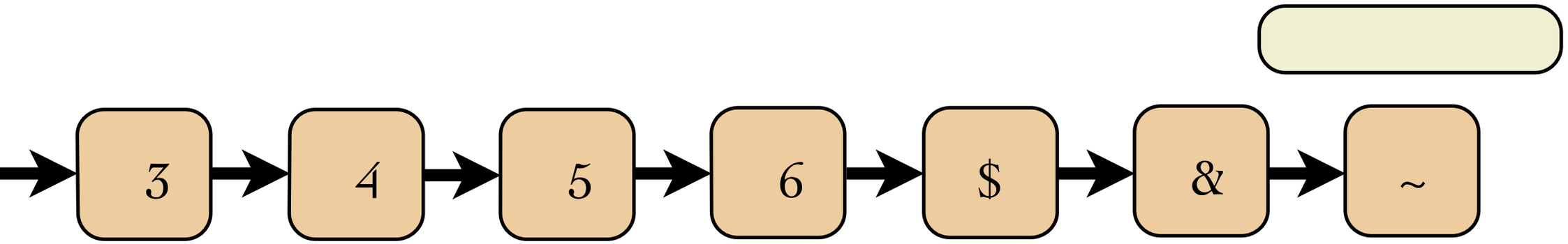

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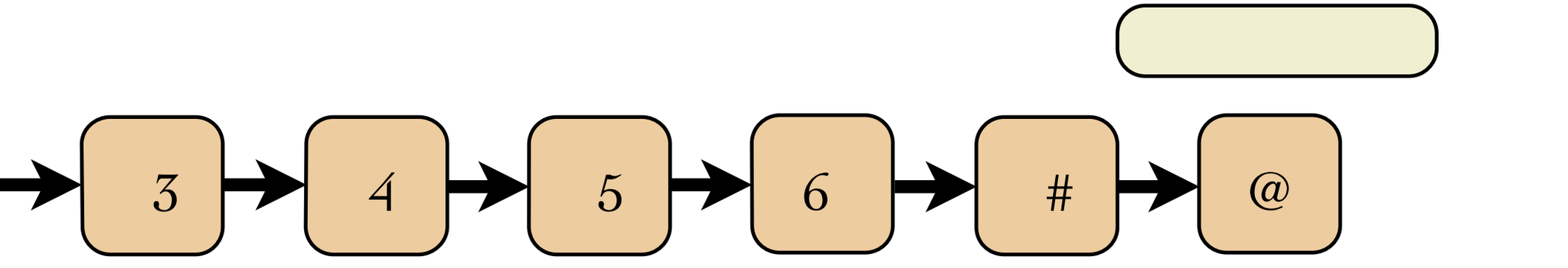
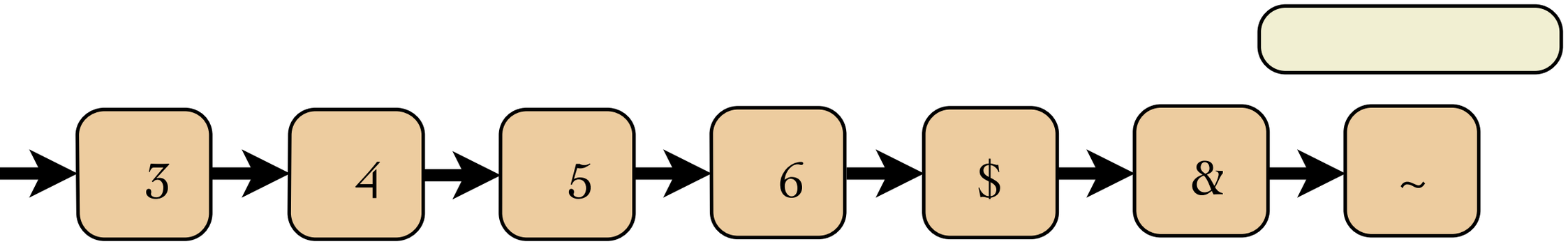


each distinct changeset
has a unique ID!



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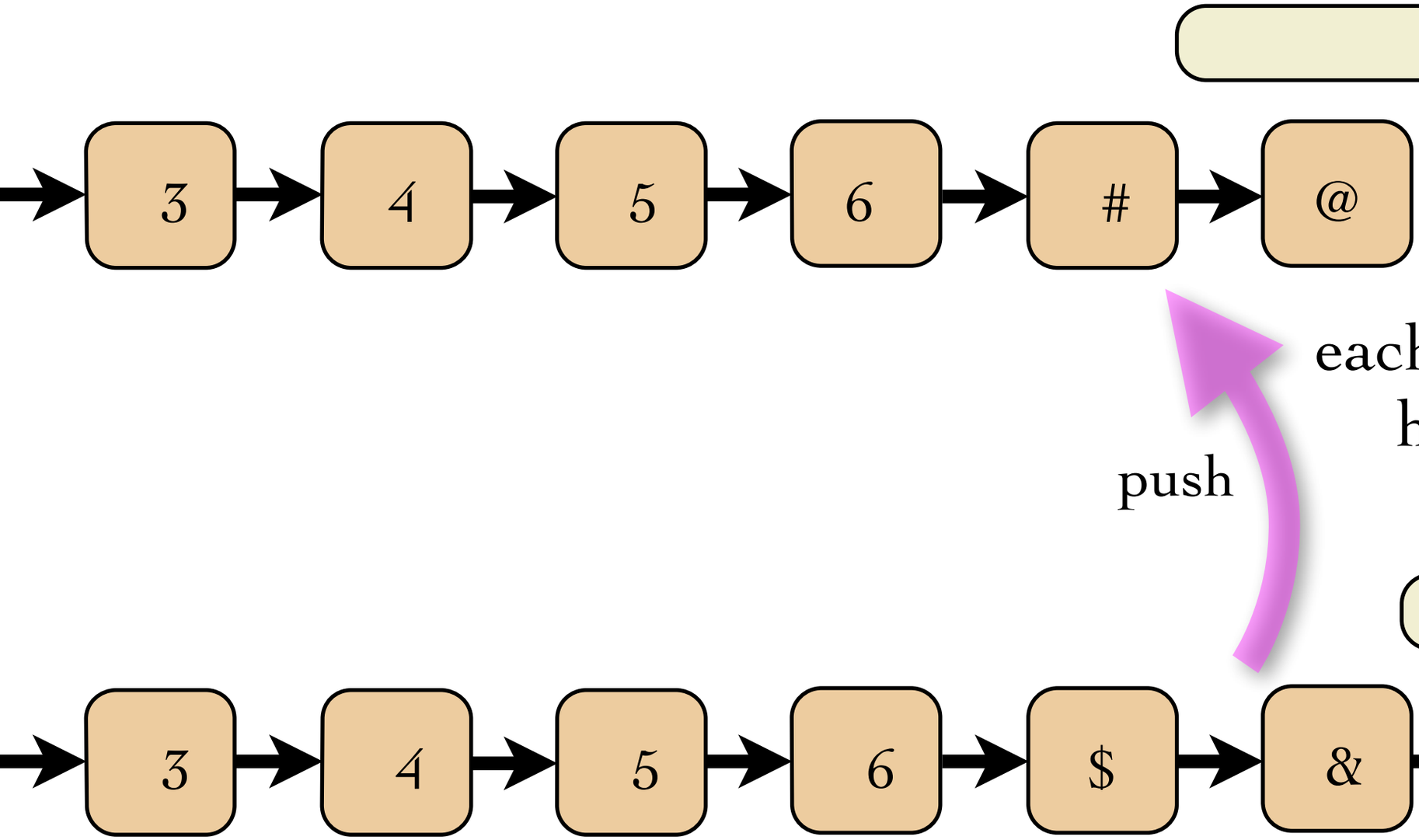

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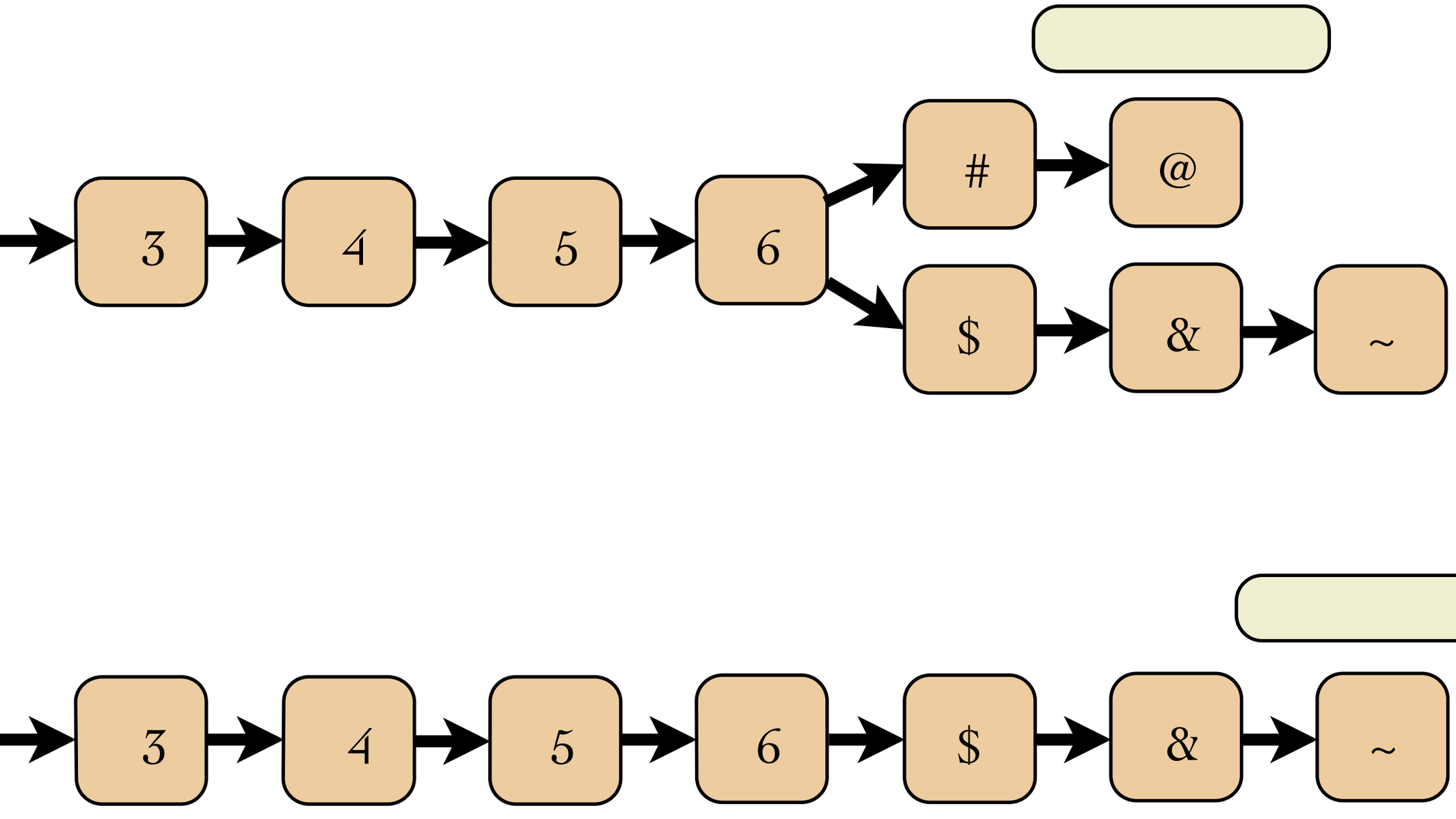
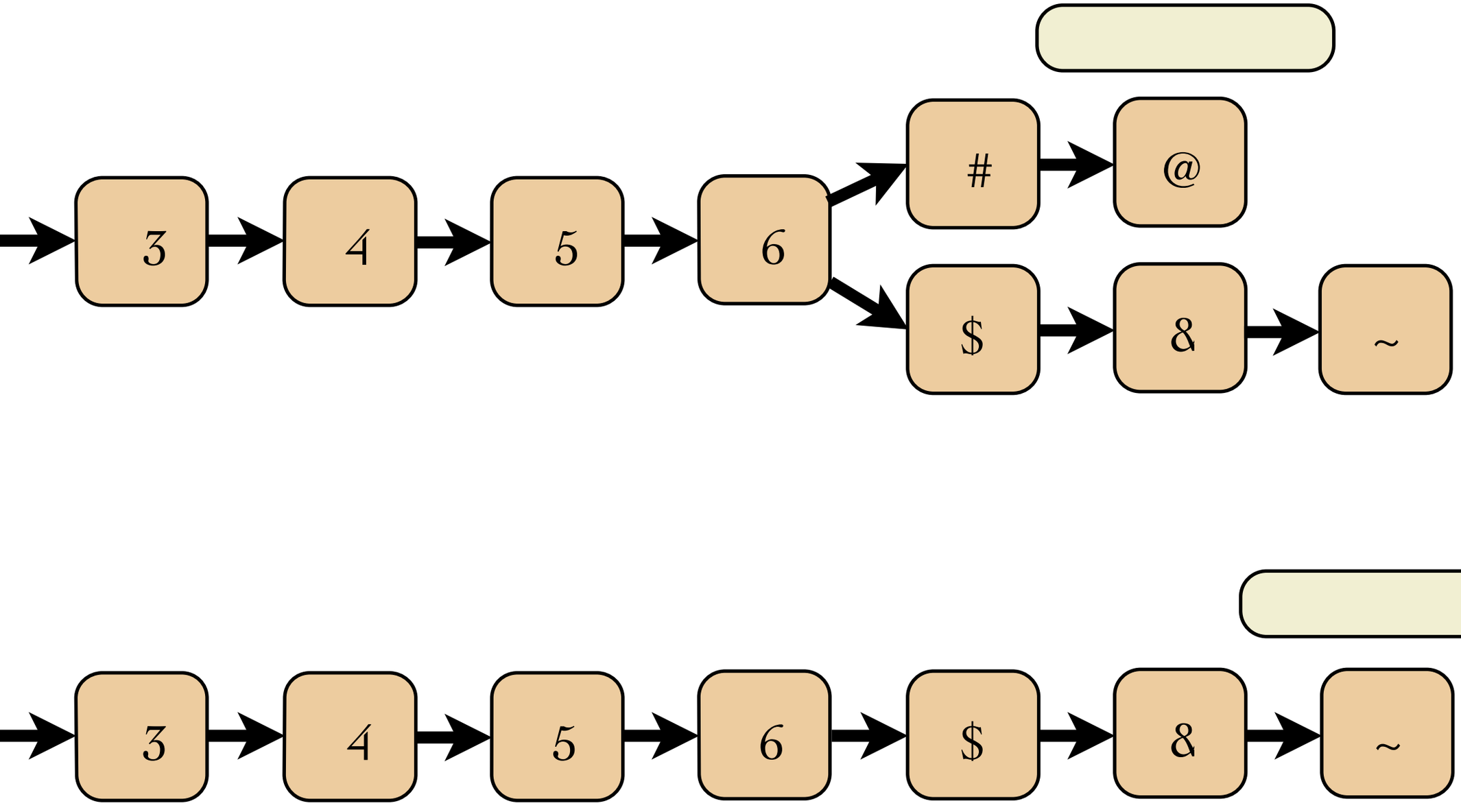


Merging

merging is automatic as far as possible



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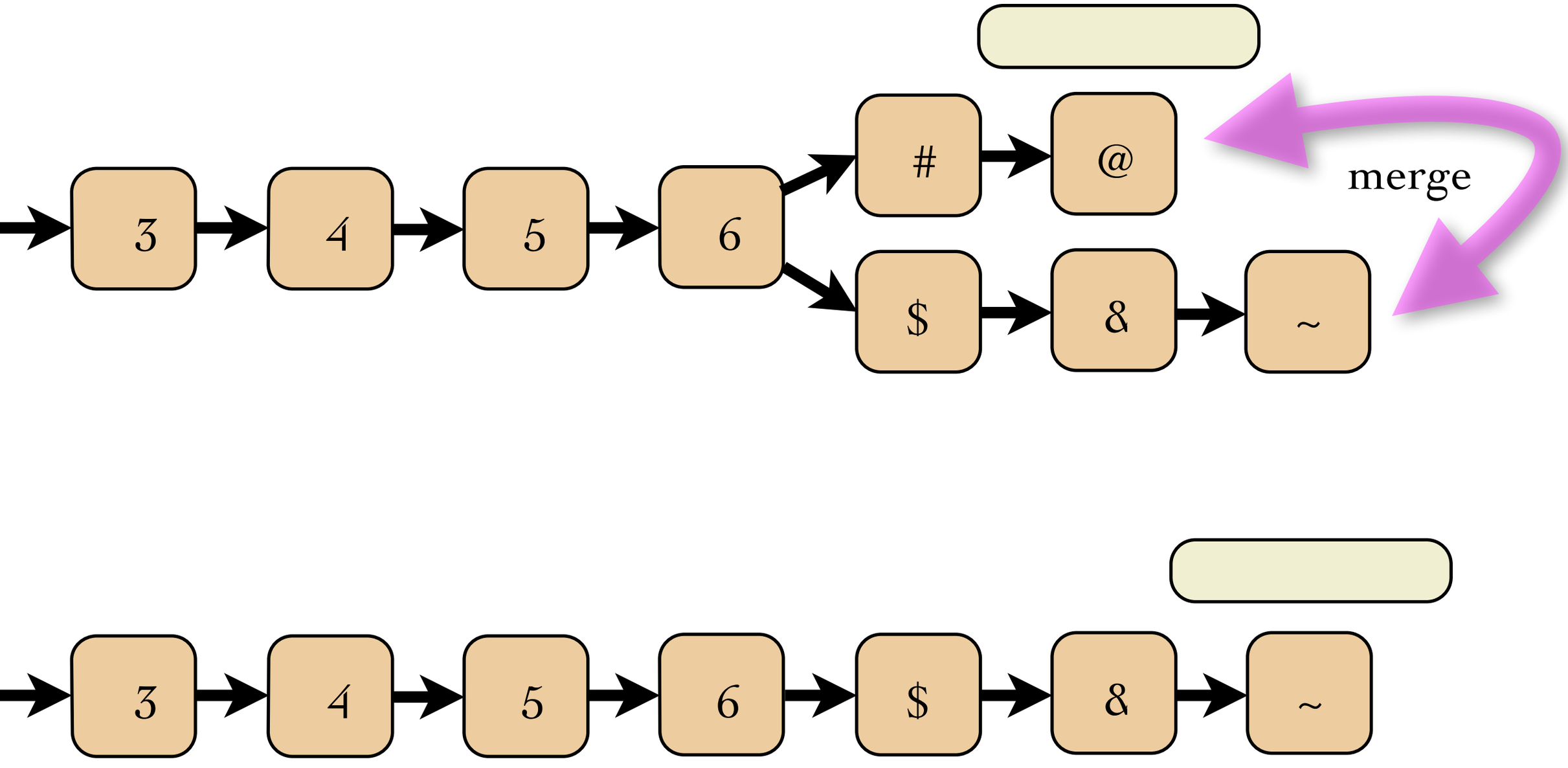

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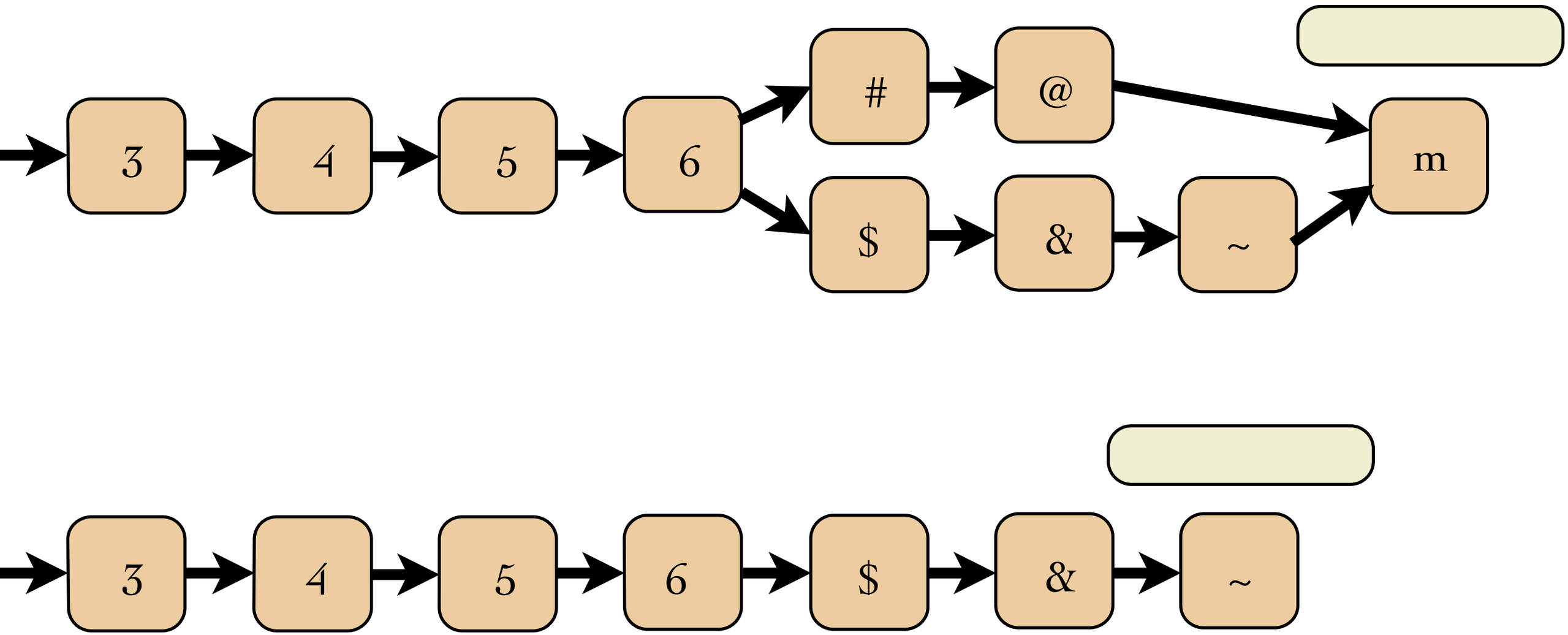

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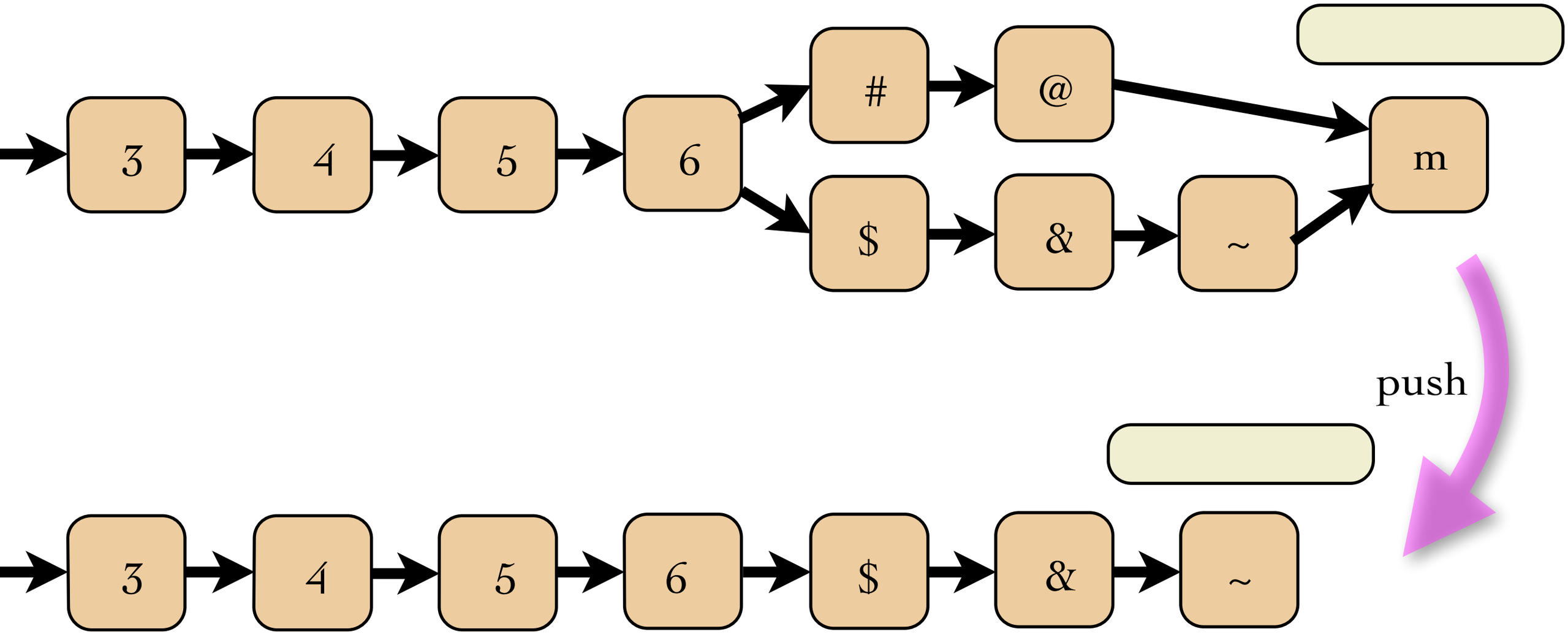

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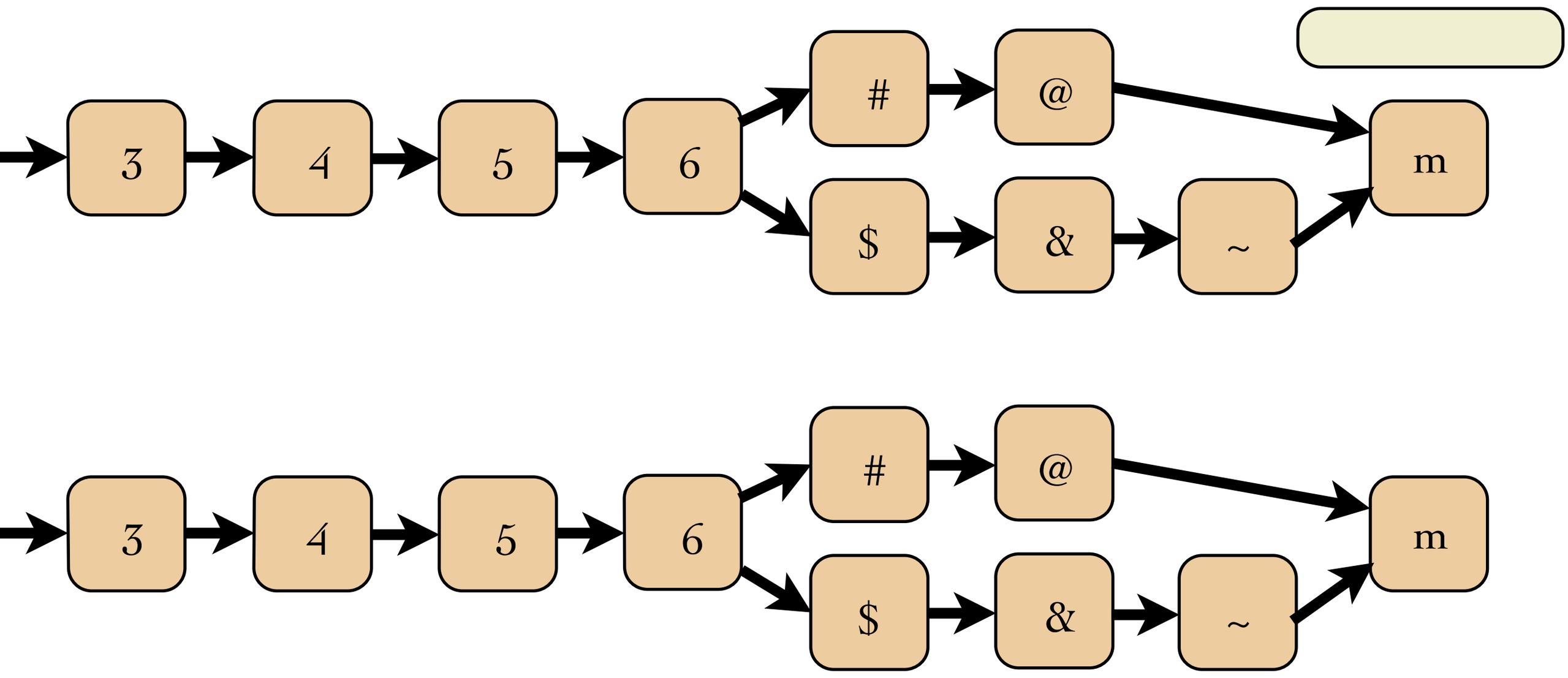
consistent state after push



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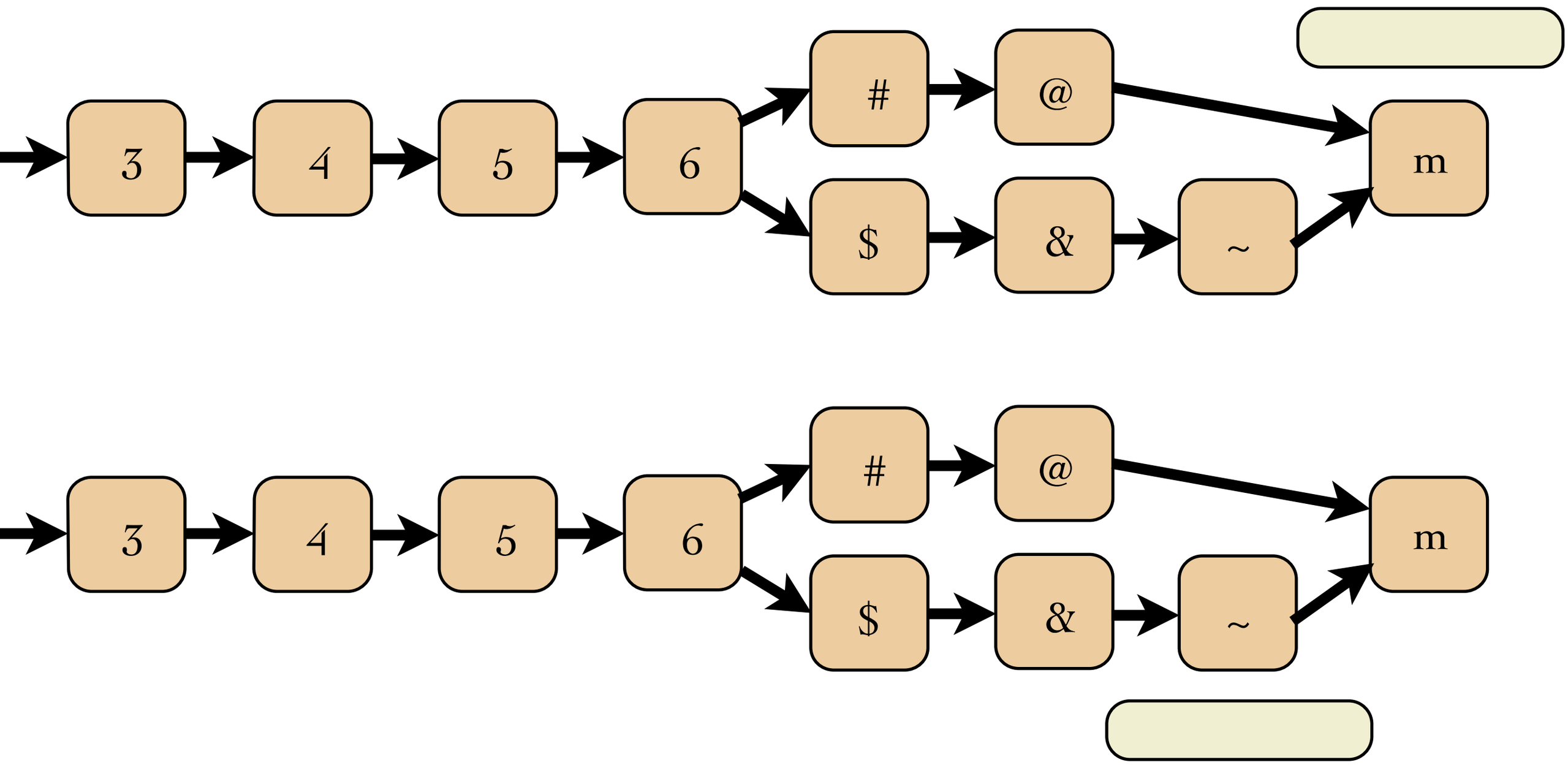

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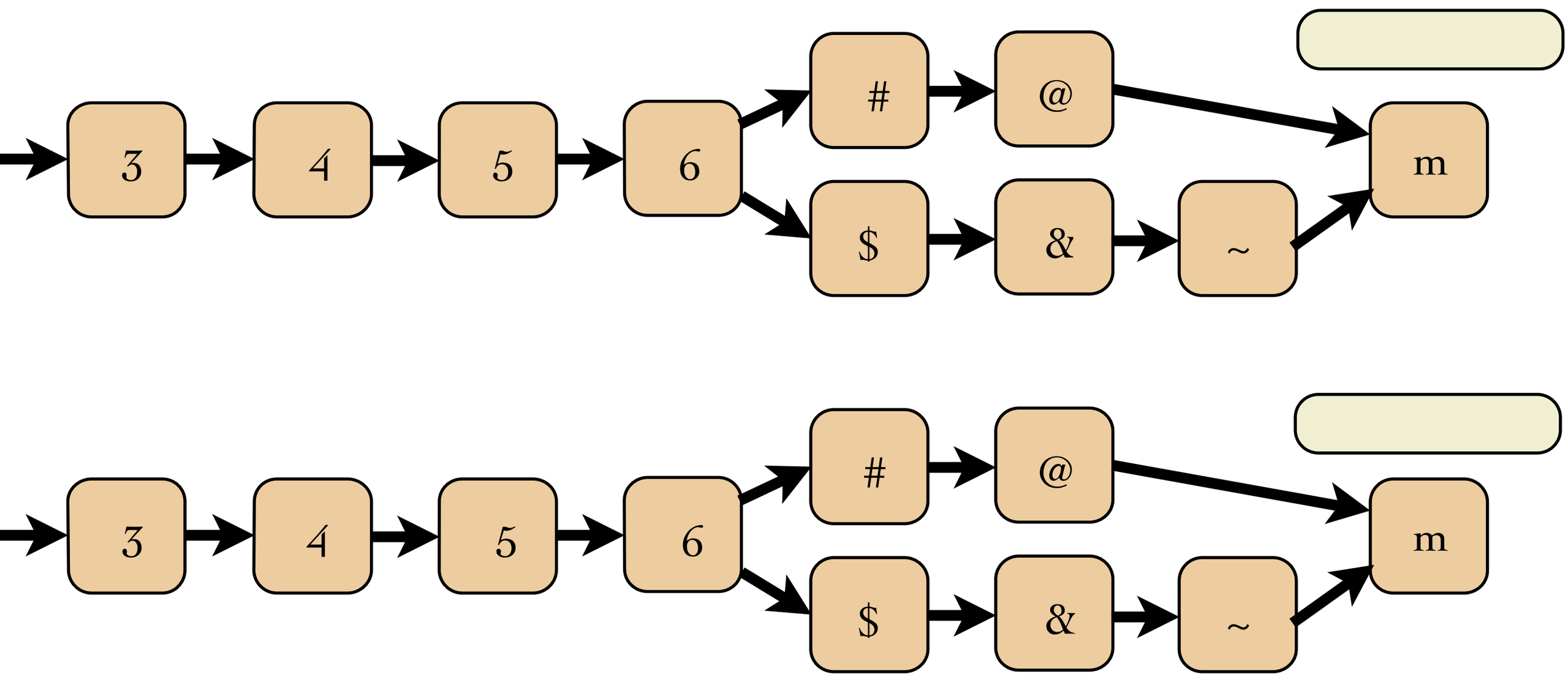
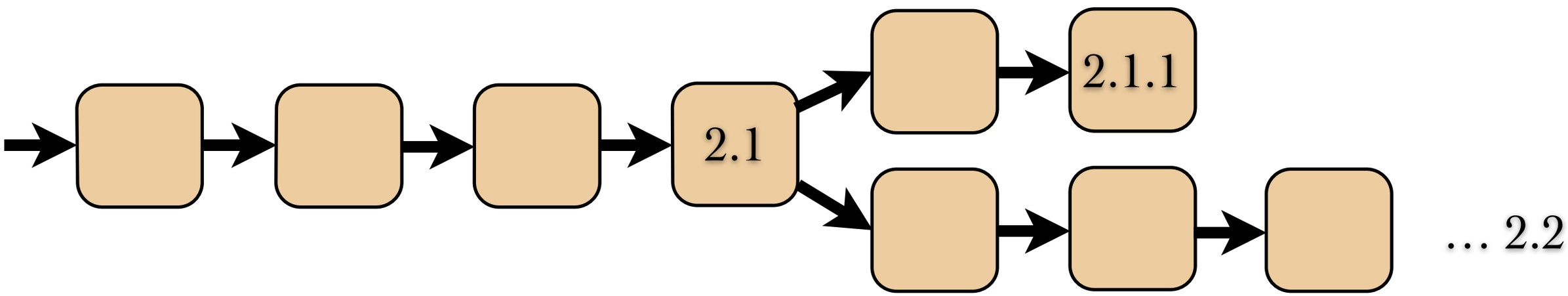


Typical usage patterns

* Technically, every repo is the same
* By agreement, designate one repo as "central"
* Tarballs or other distributions are built *only* from there
* Interaction with central repo: only `push`/`pull` from developers, no direct commits
* Can pipeline even more: put code-review, tester, build manager repos in between

Typical usage patterns

* Think about release lifetime
* Typically, separate release and feature branches
* Carefully put checkins in the right place!



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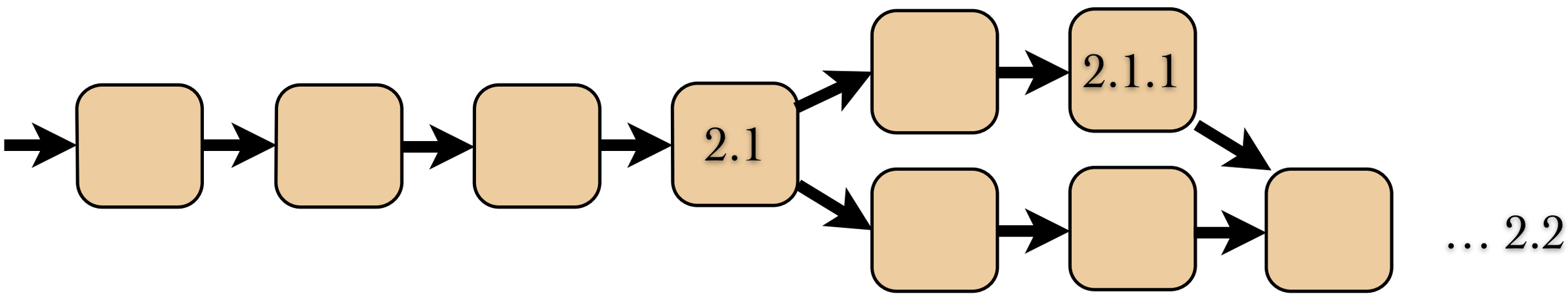
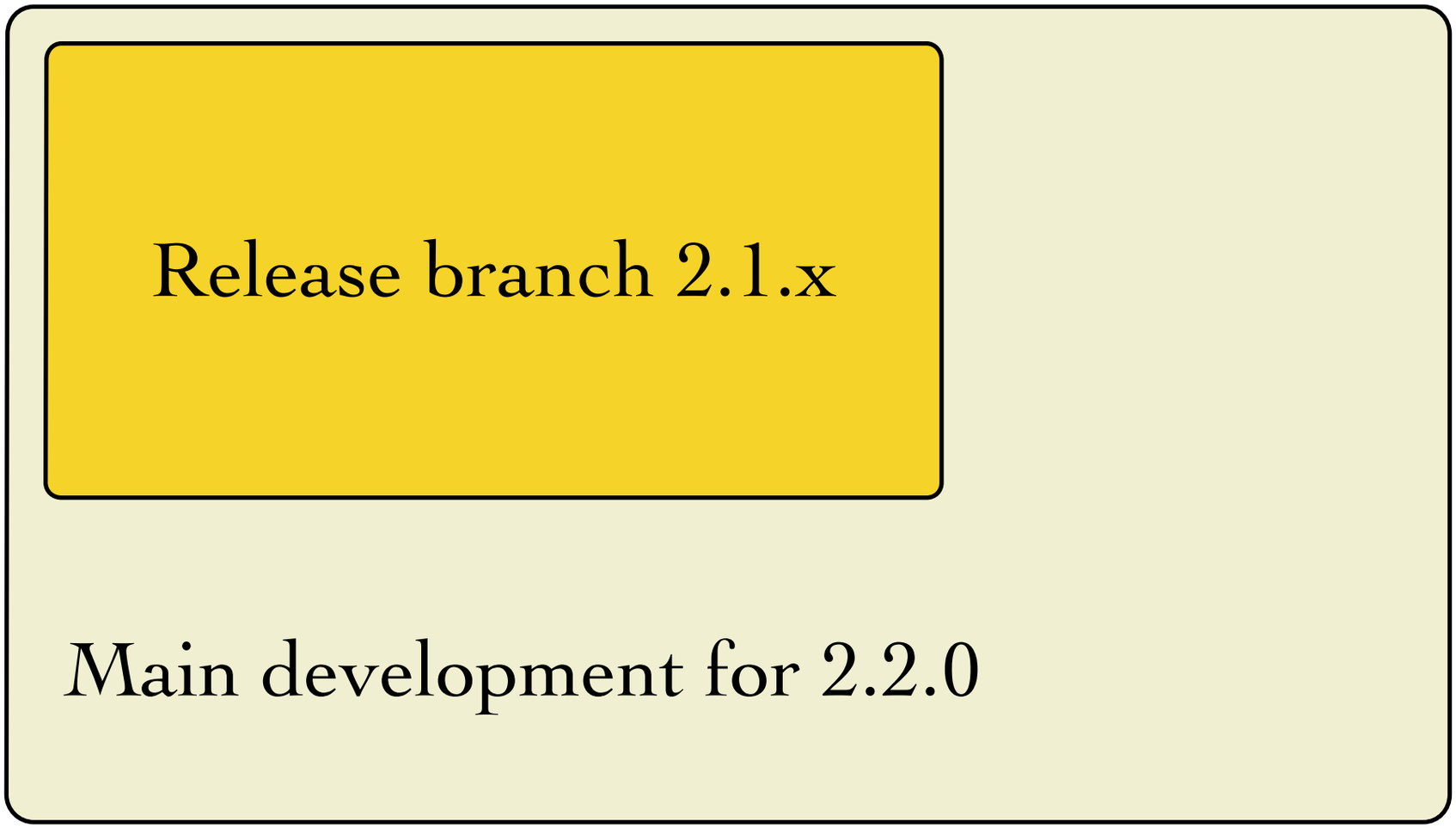


Which branch for which checkin?

* Pick the innermost appropriate branch



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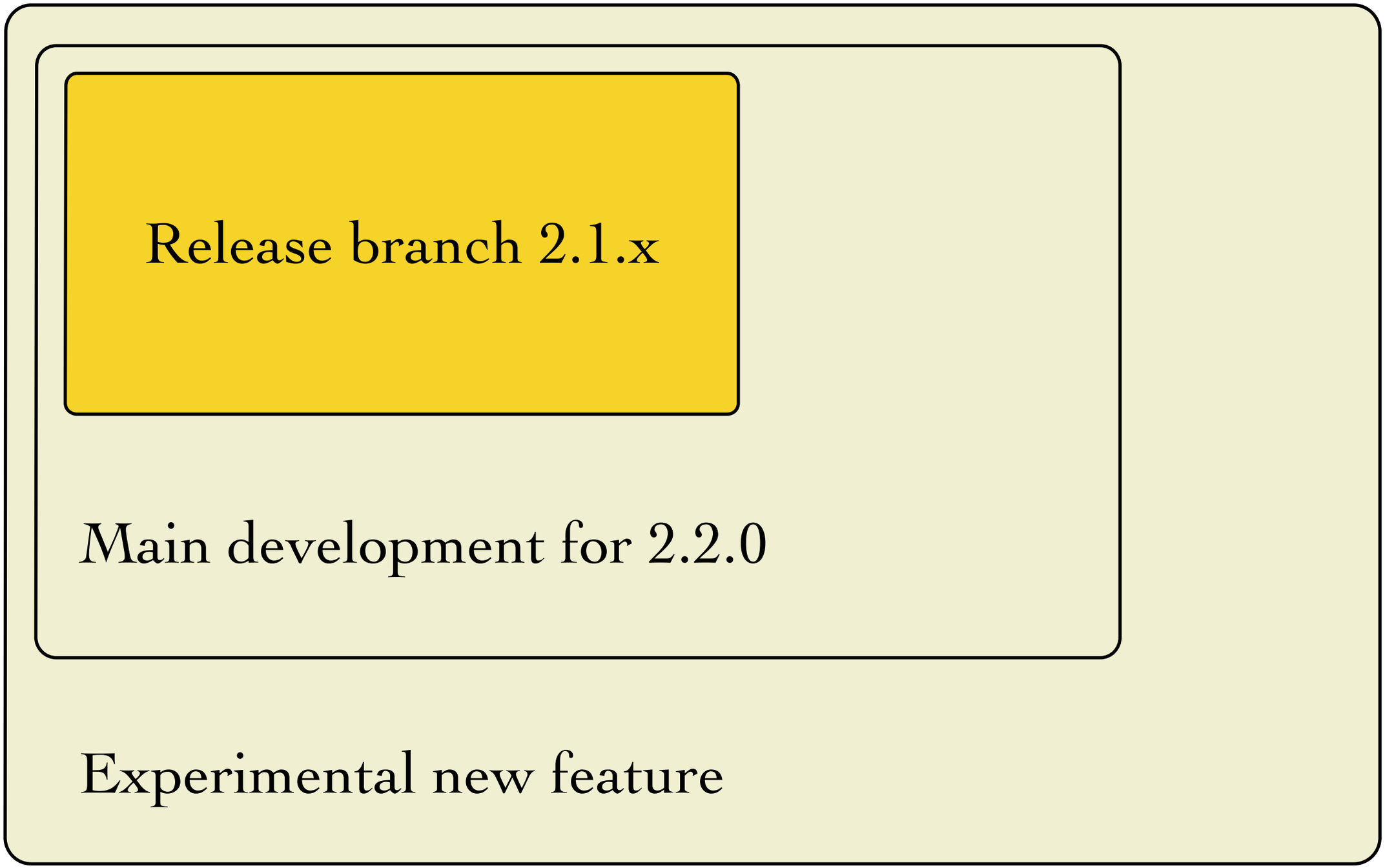

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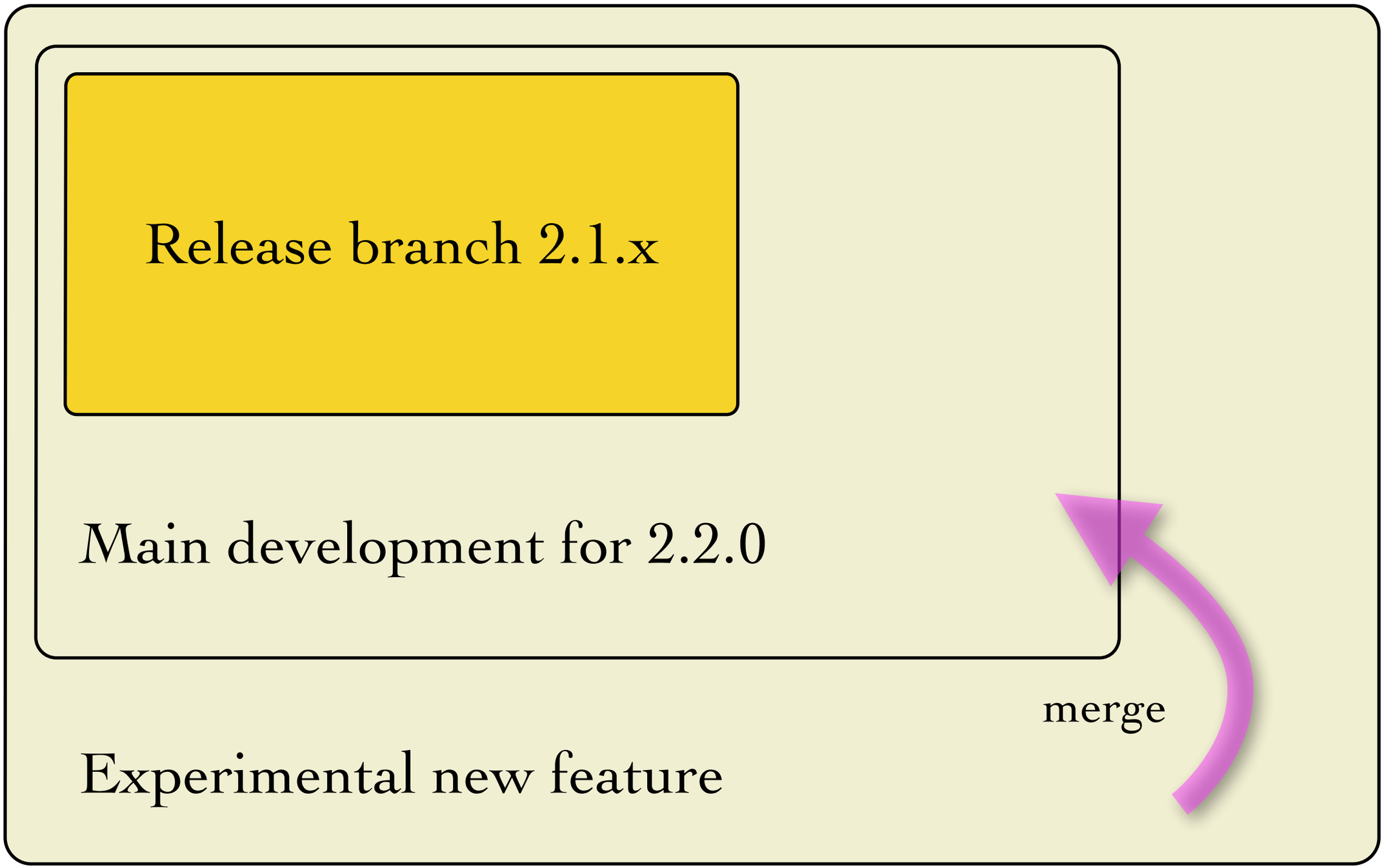

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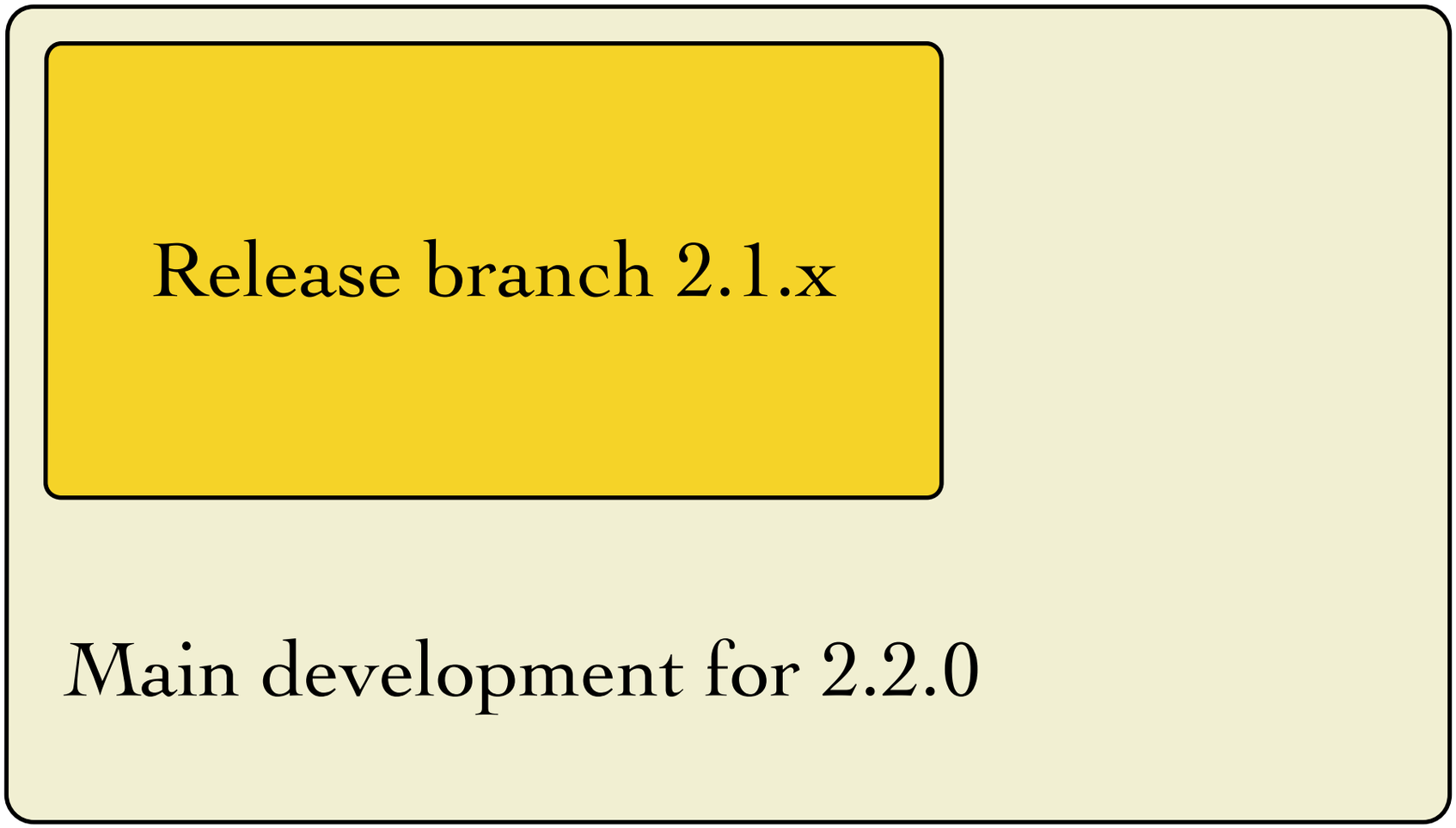

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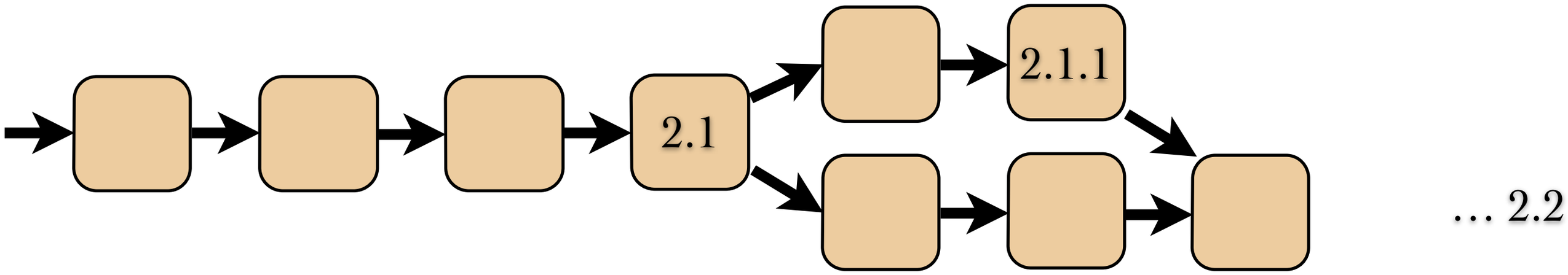

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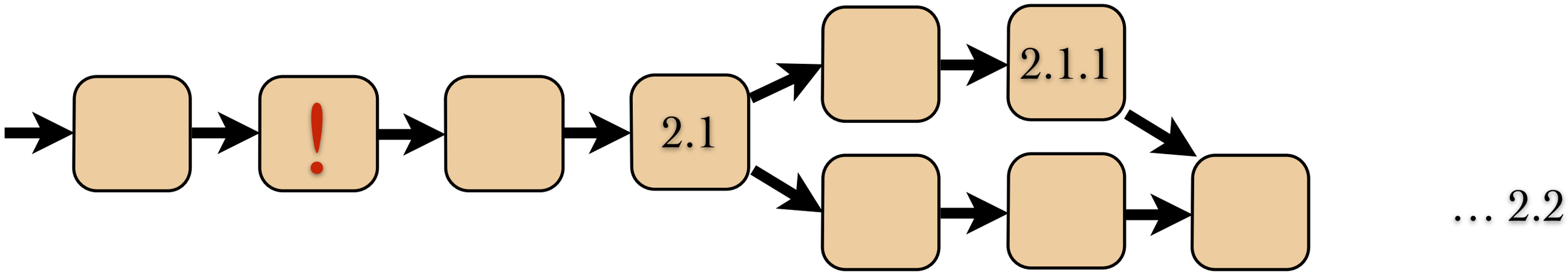

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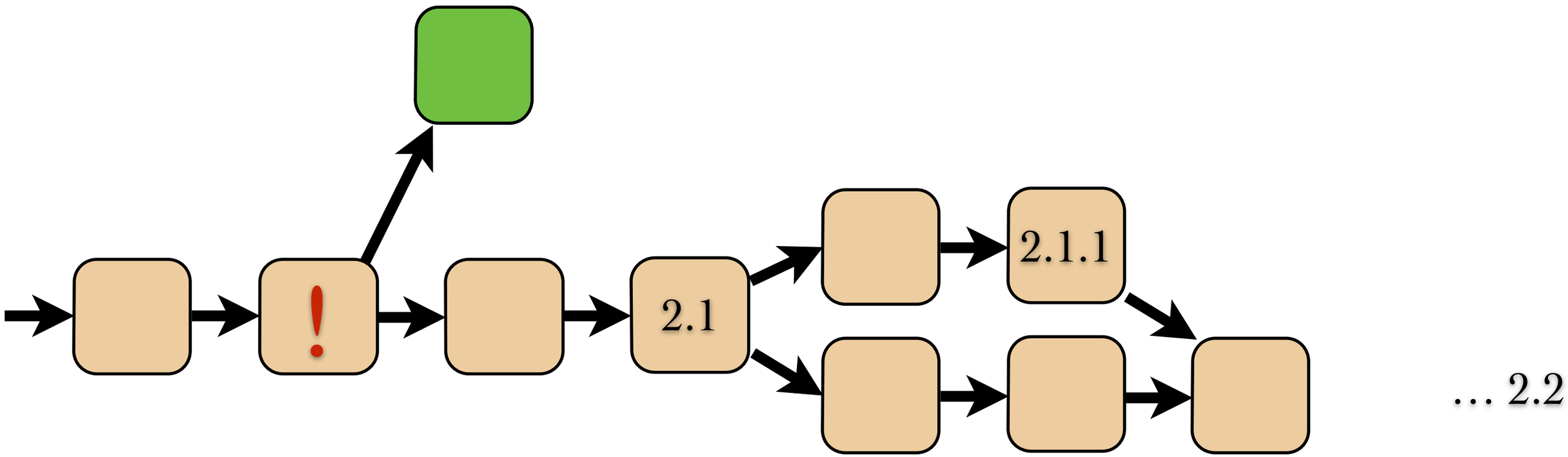

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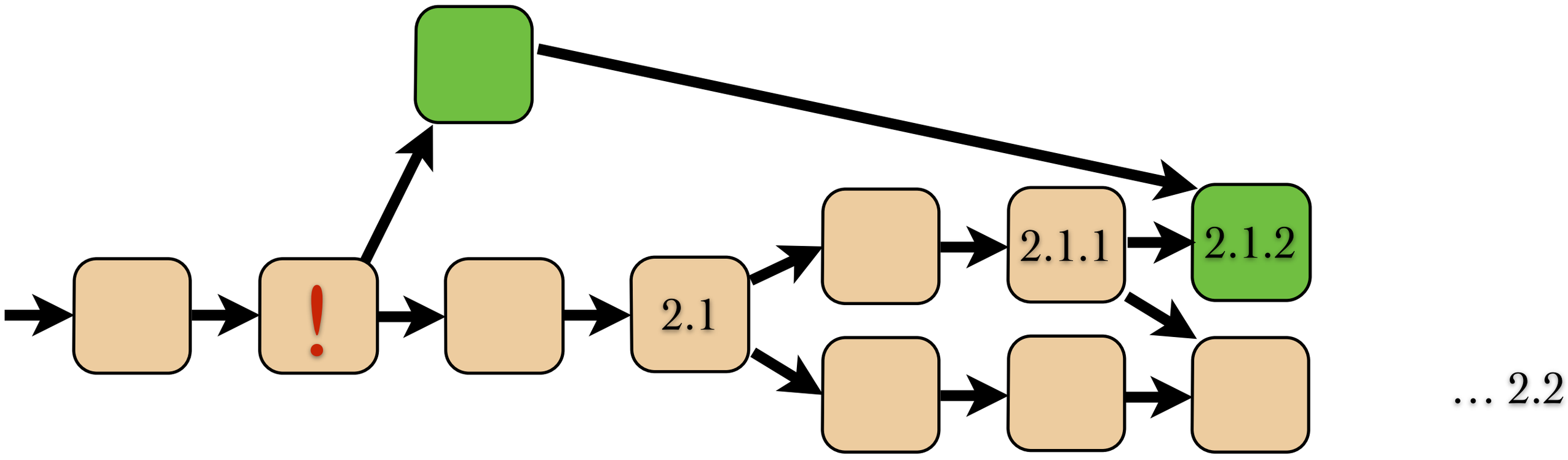

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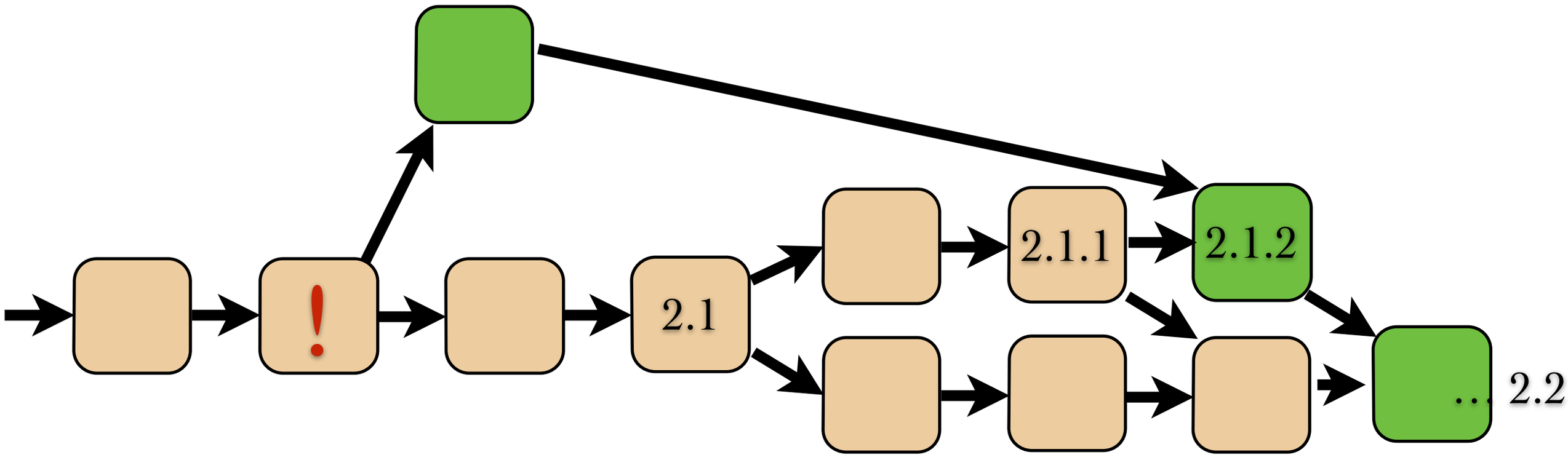

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Don't even think of writing outside version control!