# Избыточность (Redundancy)

В системе присутствует избыточное количество необходимых вам компонент. И при падении одного из таких избыточных компонент, все должно продолжать работать. При таком подходе проектирования можно выделить две стратегии:

- active-active
- active-passive

https://habrahabr.ru/post/118496/

# Active-Active

Одновременная работа с двумя идентичными компонентами.

Например в системе, где клиент получает цены котировок, он может подписаться сразу в два разных компонента и получать цены одновременно из двух мест. Если один из таких компонентов упадет, то клиент вообще не заметит, что в системе случилась какая-то проблема, что является несомненным плюсом данного подхода.

# Active-Passive

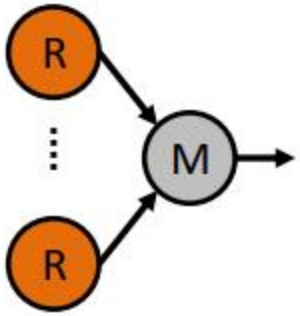
Данная стратегия, представляет собой только один постоянно рабочий компонент, в случае падения которого, автоматически поднимается второй, восстанавливает состояние и берет на себя всю работу.

http://www.ieee802.org/1/files/public/docs2013/new-tsn-specht-redundancy-terminology-20130115-v01.pdf

# Activation of Redundancy

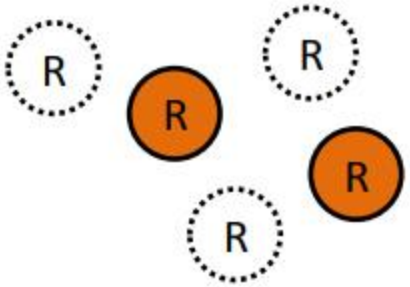
- ***Static** Redundancy*:

  Redundancy (redundant streams, links, topologies, …) is continuously used by the service of interest, regardless whether faults are present or not. Faults are tolerated by e.g. *fault masking.*




- ***Dynamic** Redundancy*:

  Redundancy is activated on demand by a service of interest in presence of faults typically after *reconfiguration*.



http://www.ieee802.org/1/files/public/docs2013/new-tsn-specht-redundancy-terminology-20130115-v01.pdf

# Static vs. Dynamic Redundancy

| | Static Redundancy | Dynamic Redundancy |
|---|---|---|
| **Resource utilization** | Resource intensive:<br>Resources are always use, regardless whether faults are present or not.<br>Faults are tolerated by *fault masking* | Resource friendly:<br>Resources are used on demand in presence of faults by *reconfiguration* |
| **Timing behavior** | Requires no failover time, i.e. the time consumption is low | Additional failover time required |
| **Reliability** | Provides highest short term reliability | Provides high long-term reliability |

- *Hybrid Redundancy*:
  Comprises various mixed forms of *static* and *dynamic* redundancy to overcome drawbacks of *static* and *dynamic* redundancy.
  Example:
  *Fault masking* until a certain threshold, followed by *reconfiguration*.

http://www.ieee802.org/1/files/public/docs2013/new-tsn-specht-redundancy-terminology-20130115-v01.pdf

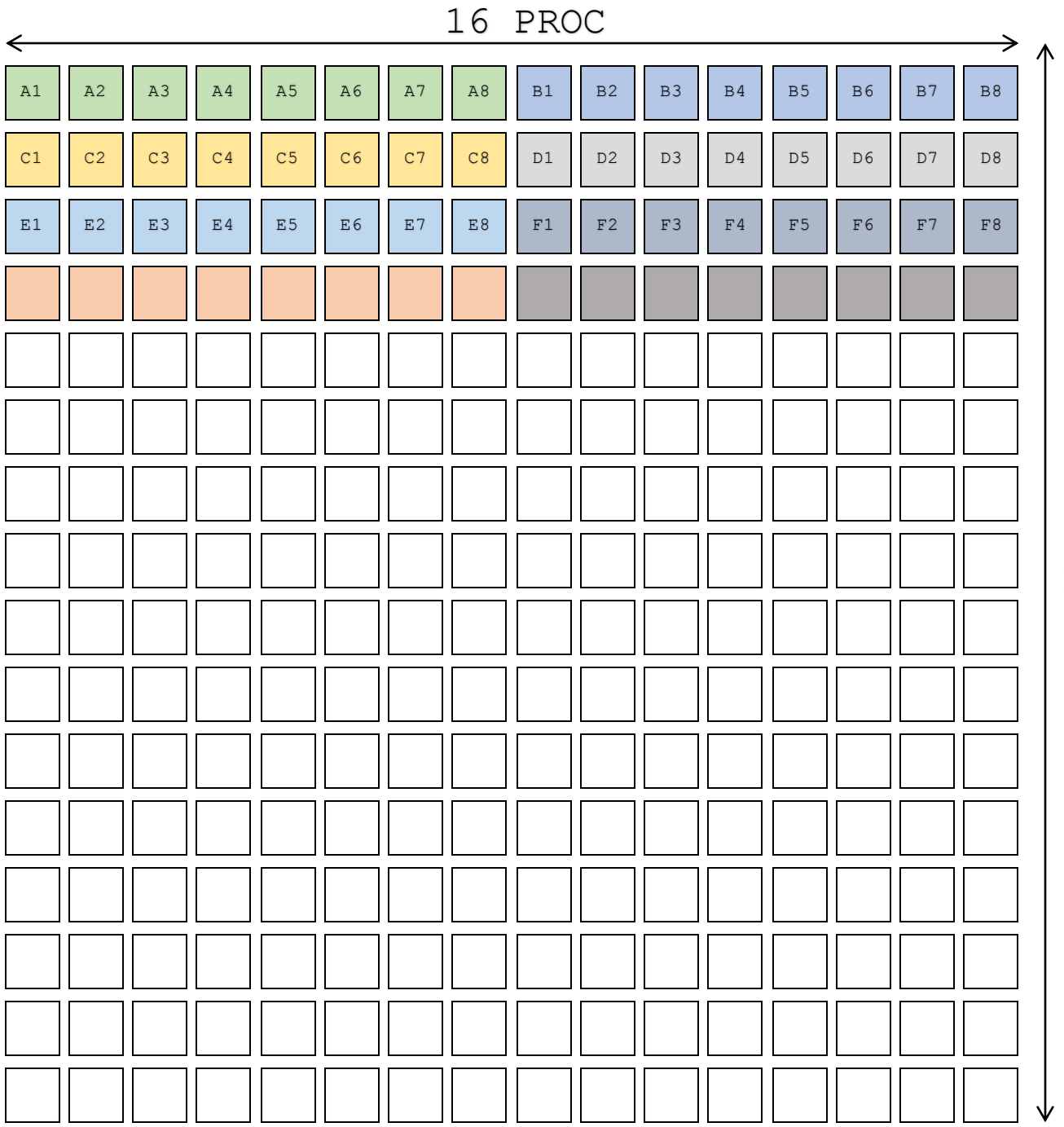
# Types of Redundancy

- ***Structural** Redundancy*:
  Multiple resources are used to provide redundancy, e.g. sending a frame twice via disjoint links, ports, paths, …


- ***Time** Redundancy*:
  One resource is used longer to provide redundancy, e.g. sending a frame twice via one link, port, path, …


- Both types can appear in a restricted form (cmp. [La], shown here for time redundancy).


- For specific mechanisms, time- and structural redundancy are not mutual exclusive, e.g. majority voting over three frames, two sent via on link and the third via another link.

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#SBATCH --nodes=32 --ntasks-per-node=8
mpiexec ./heat_2d 8192 8192
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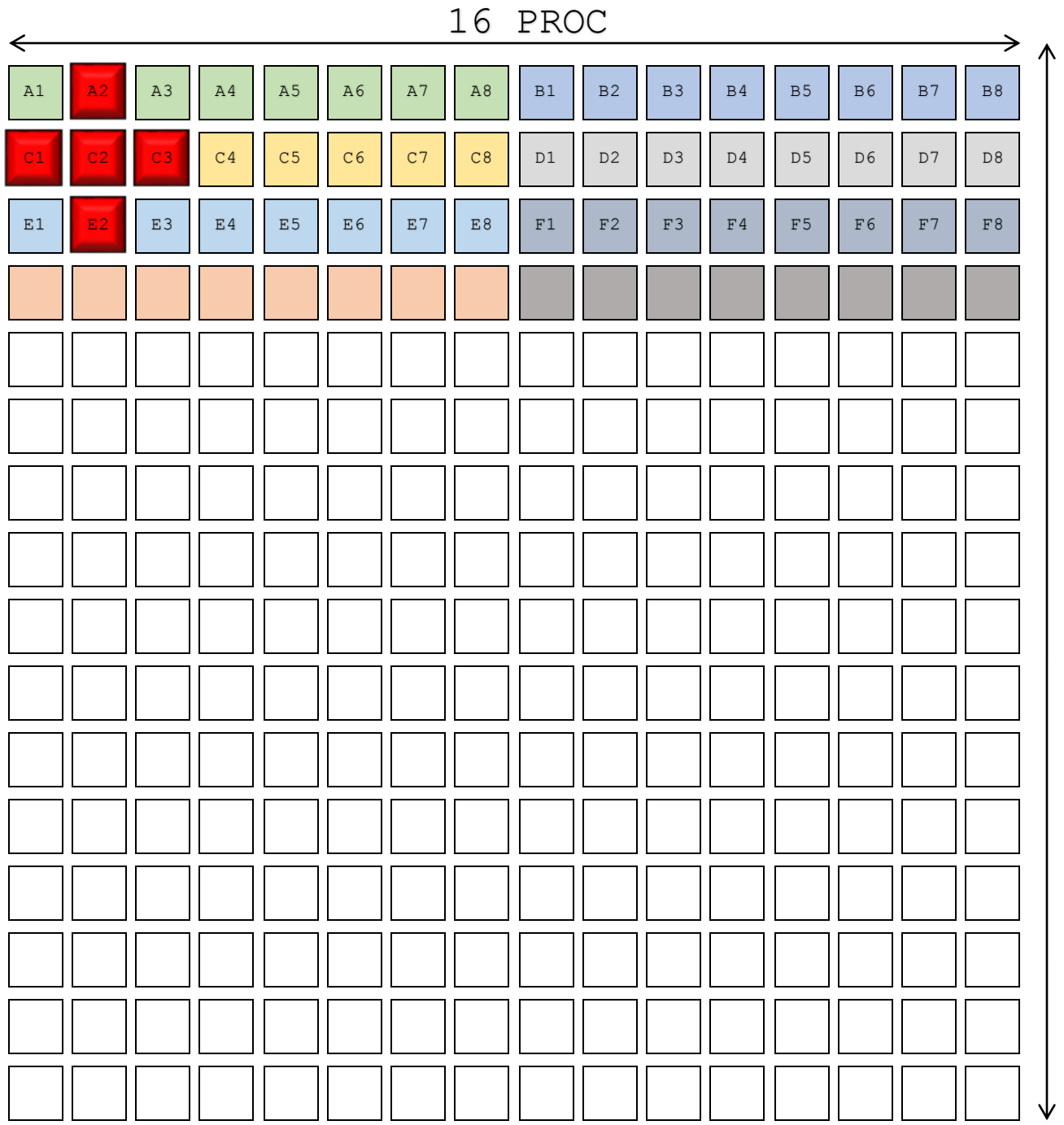


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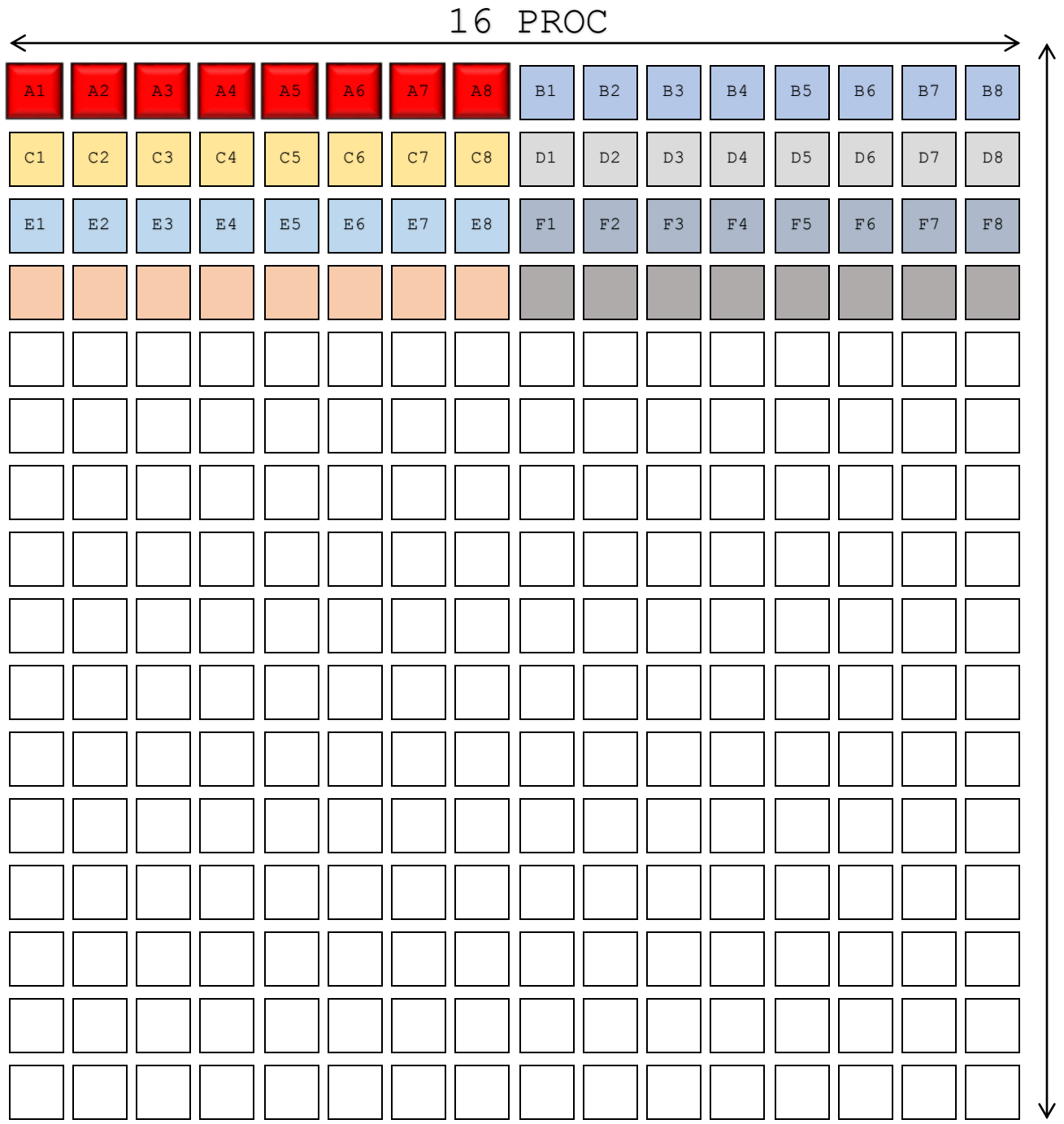


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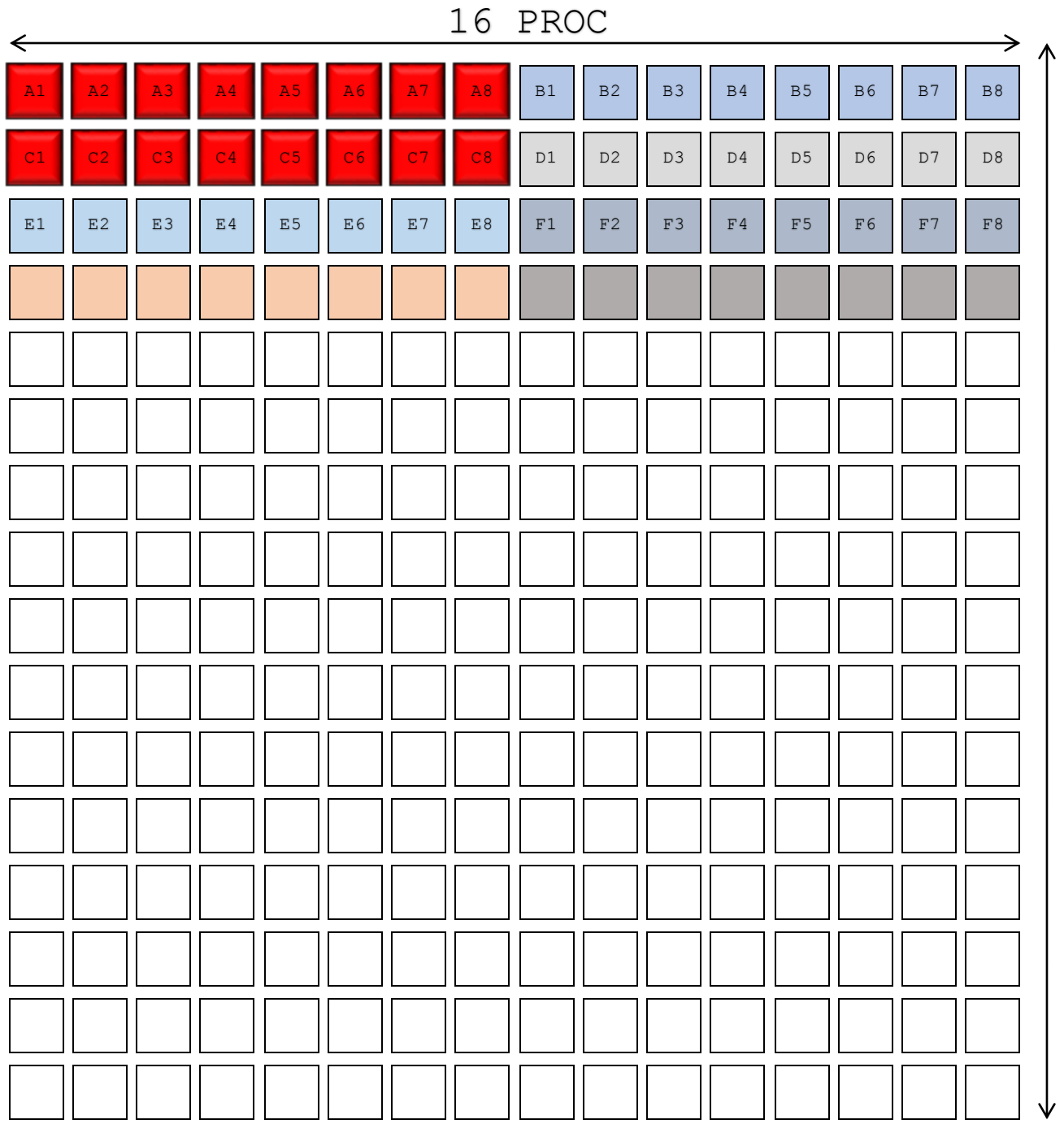


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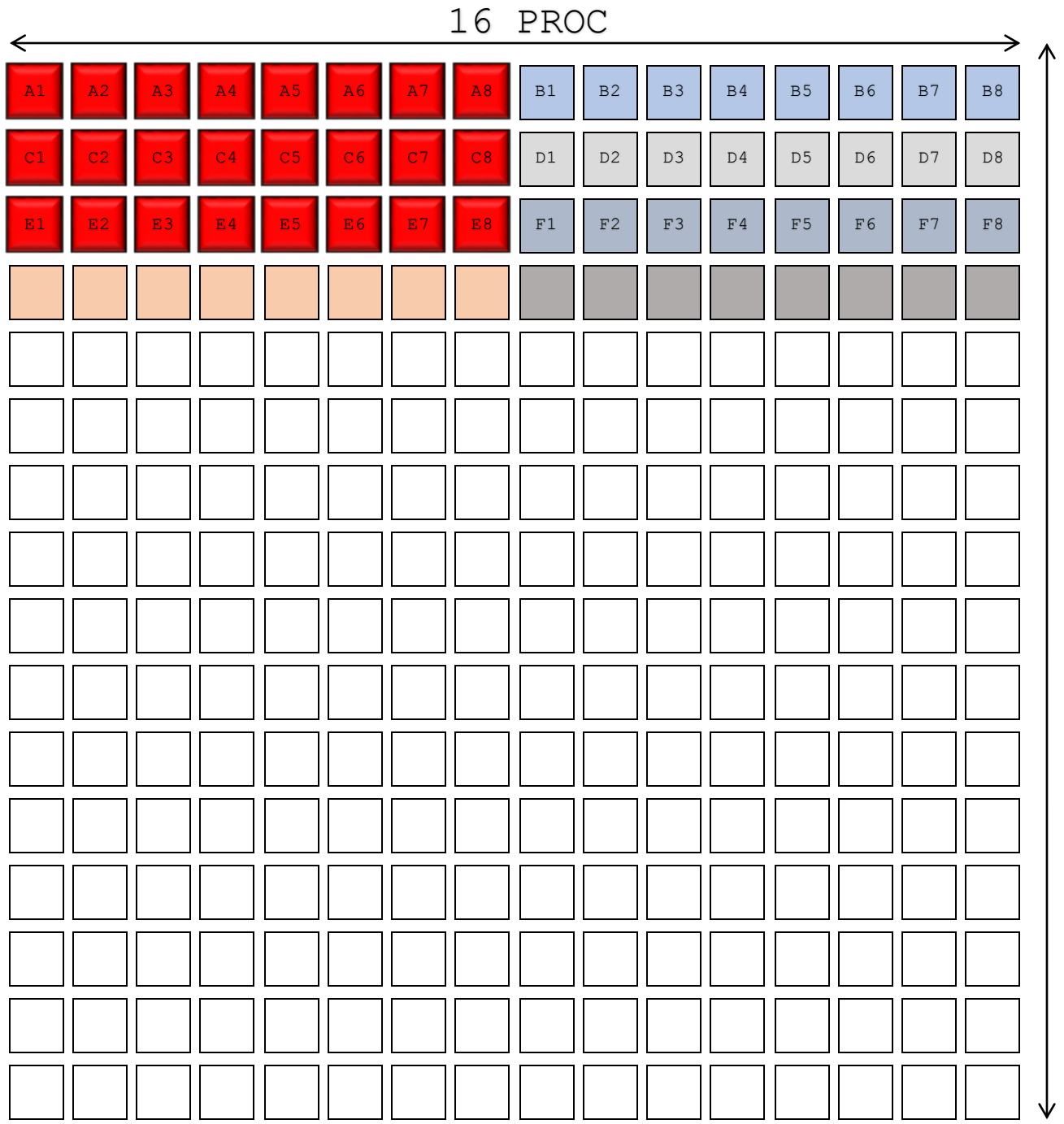


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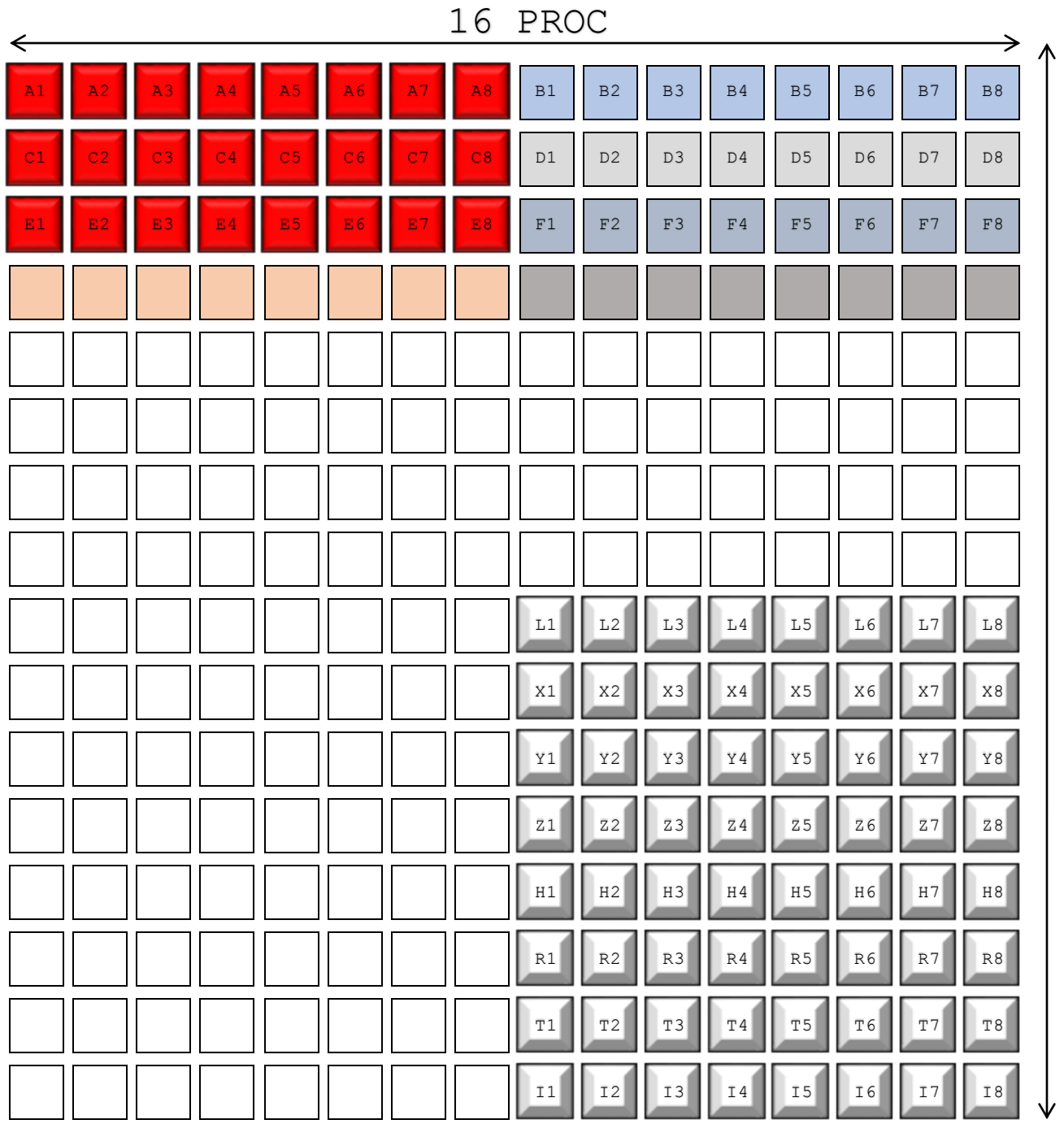


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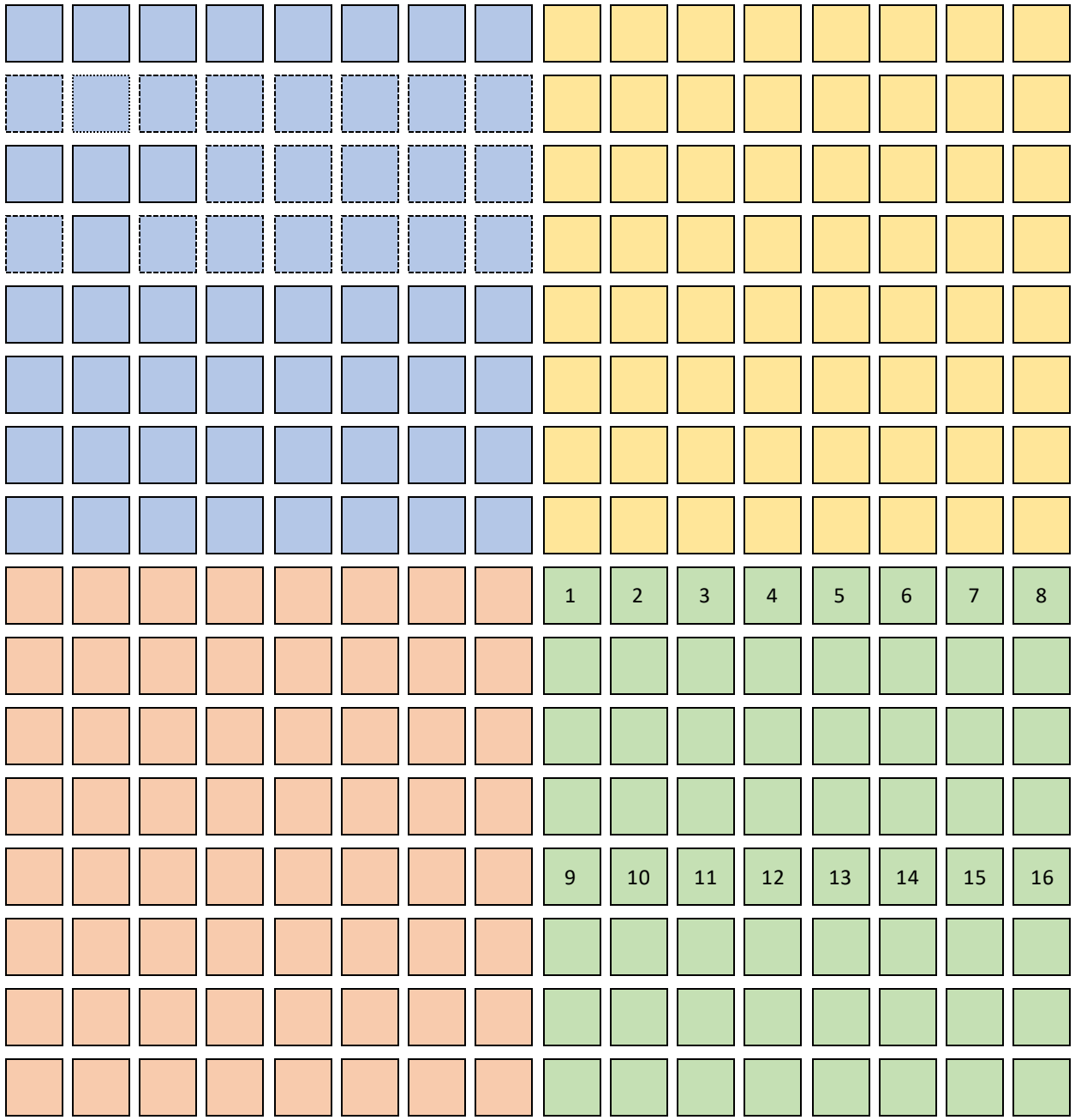
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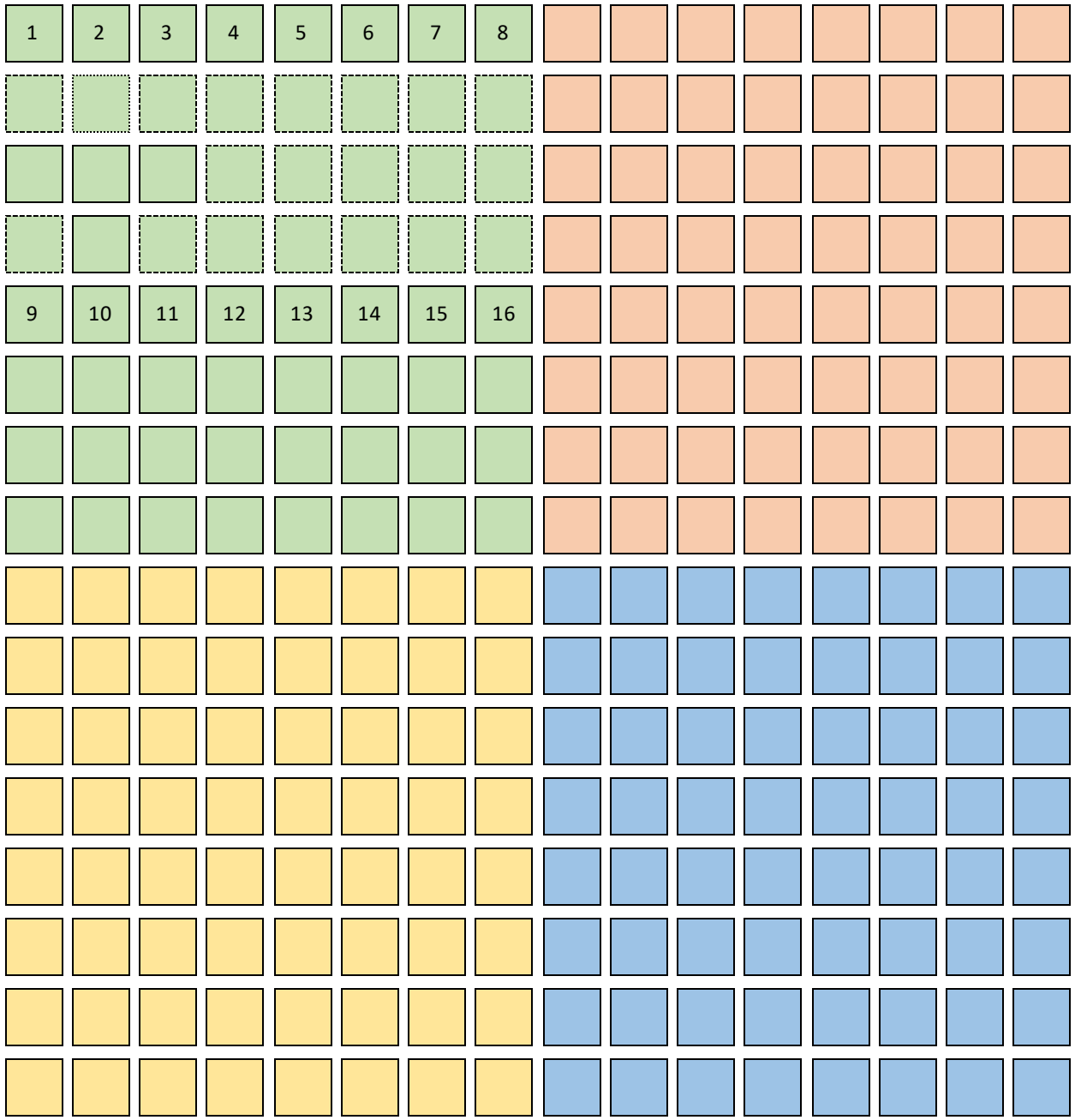
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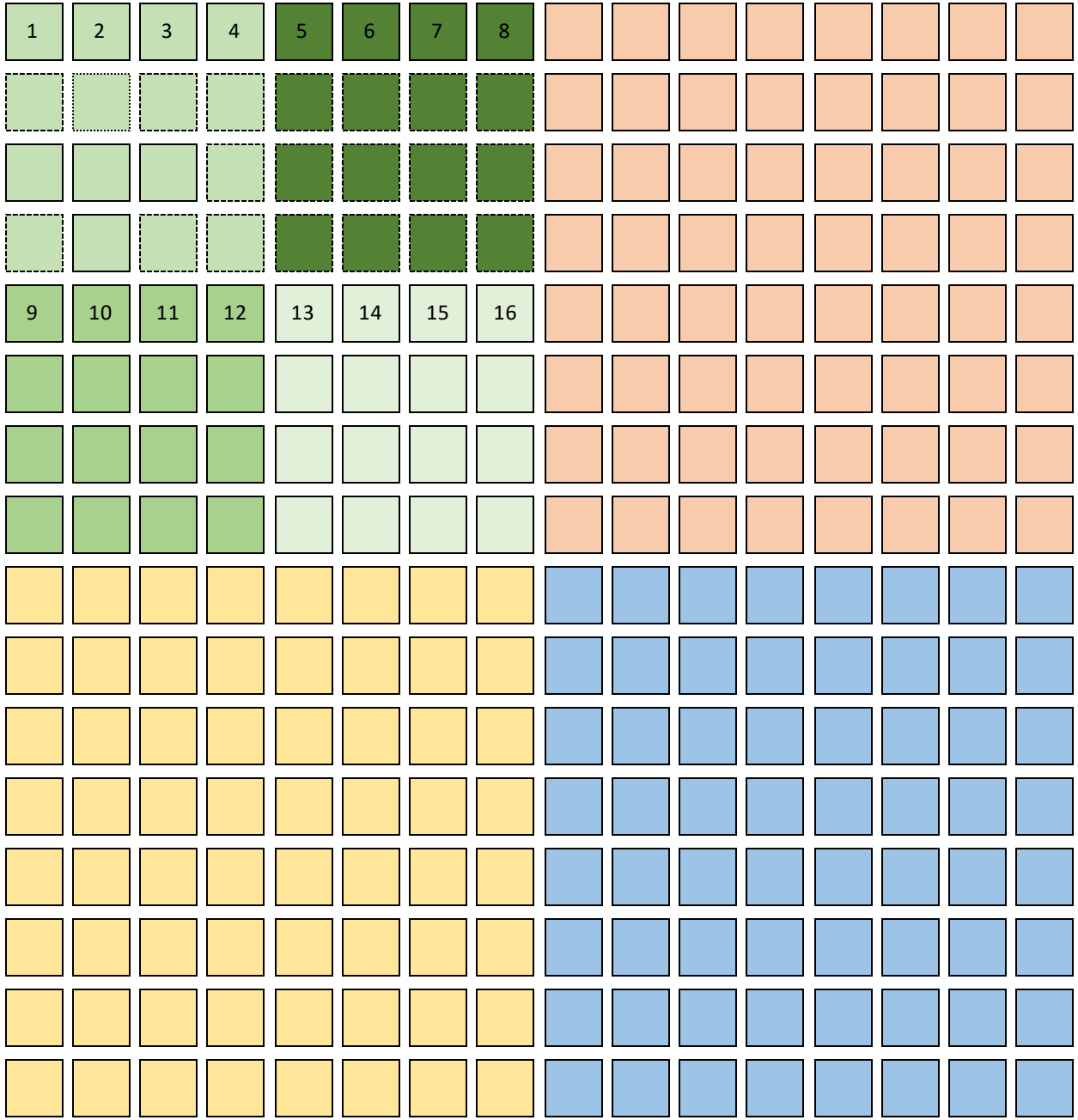
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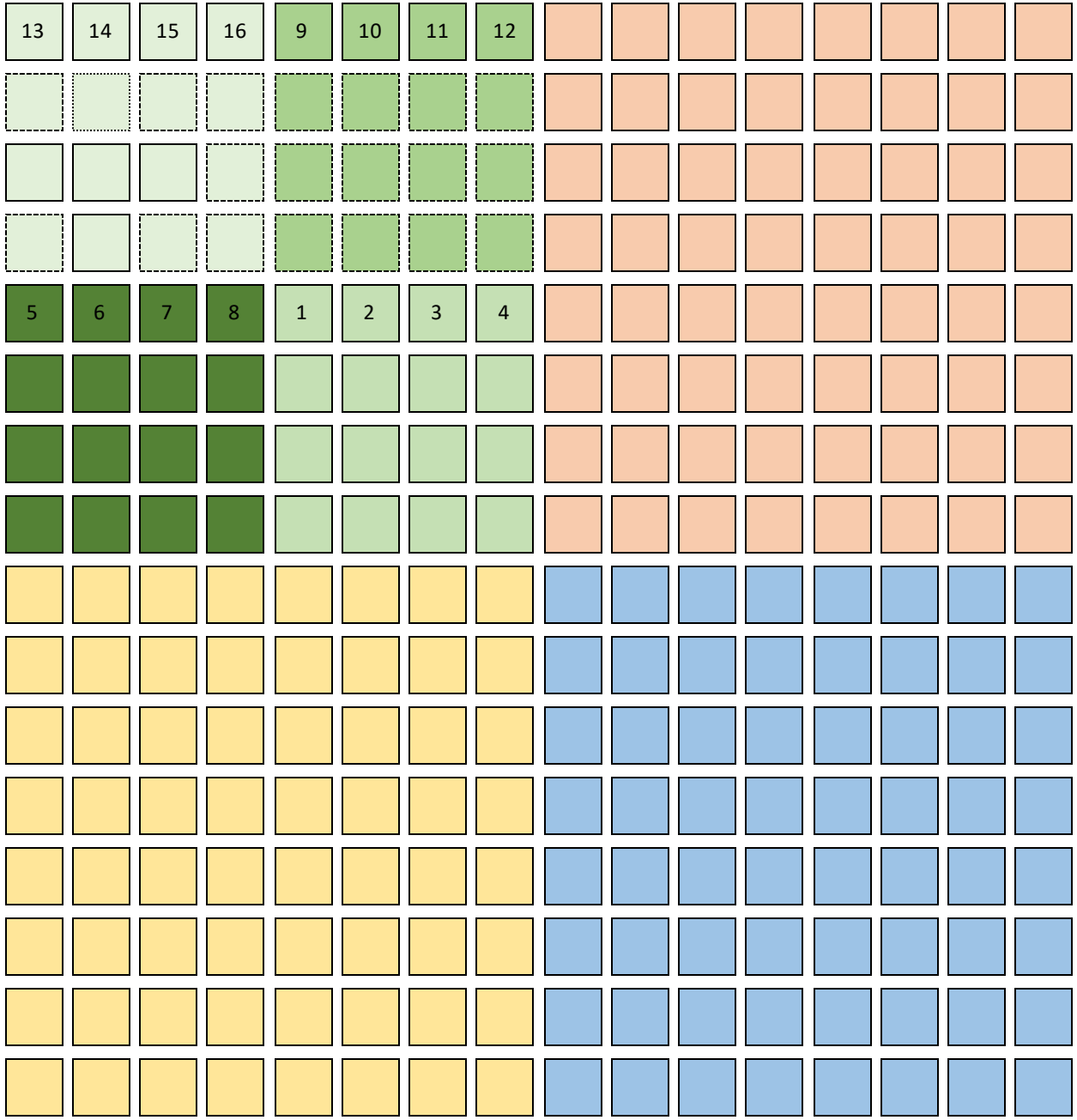
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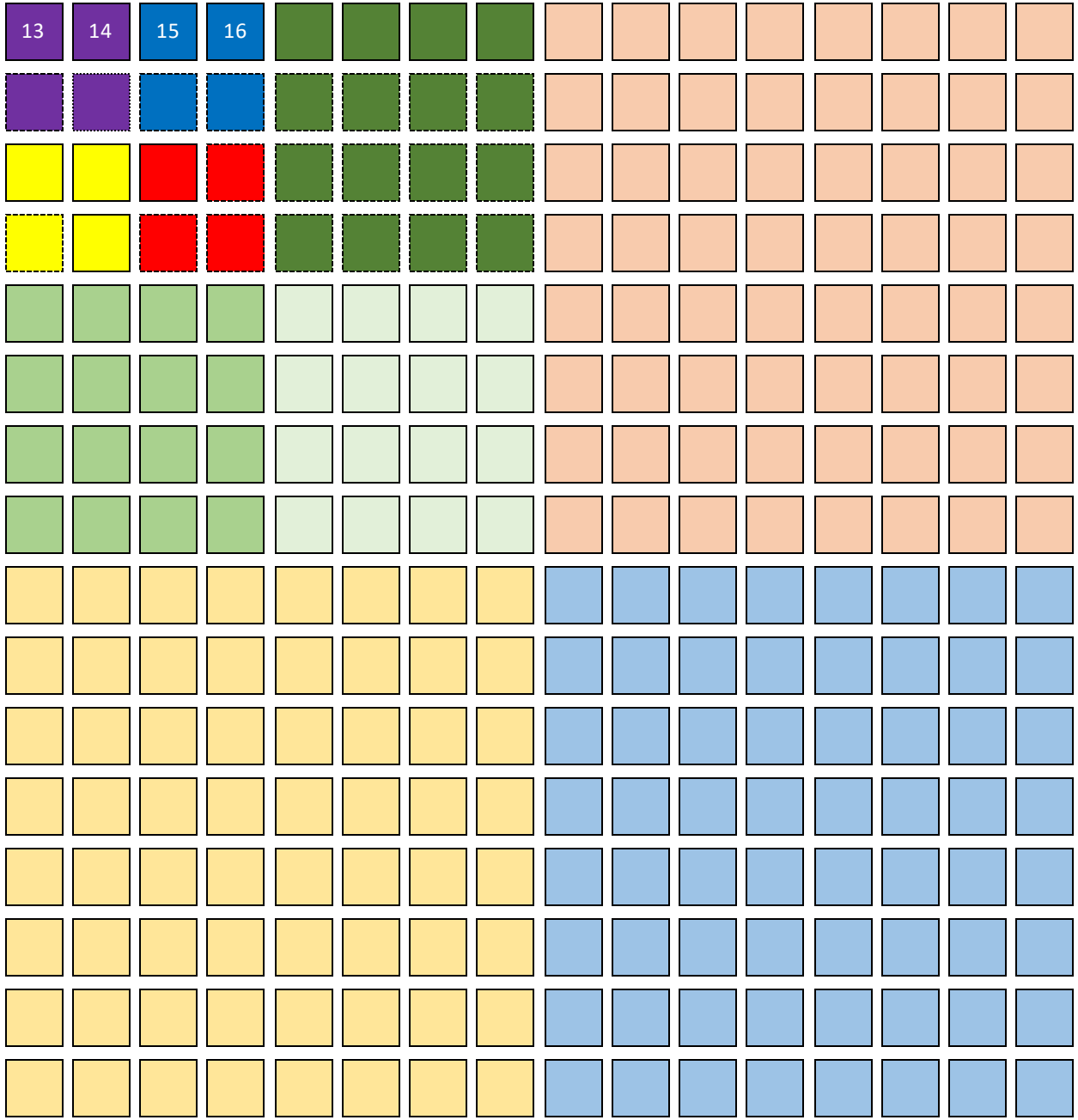
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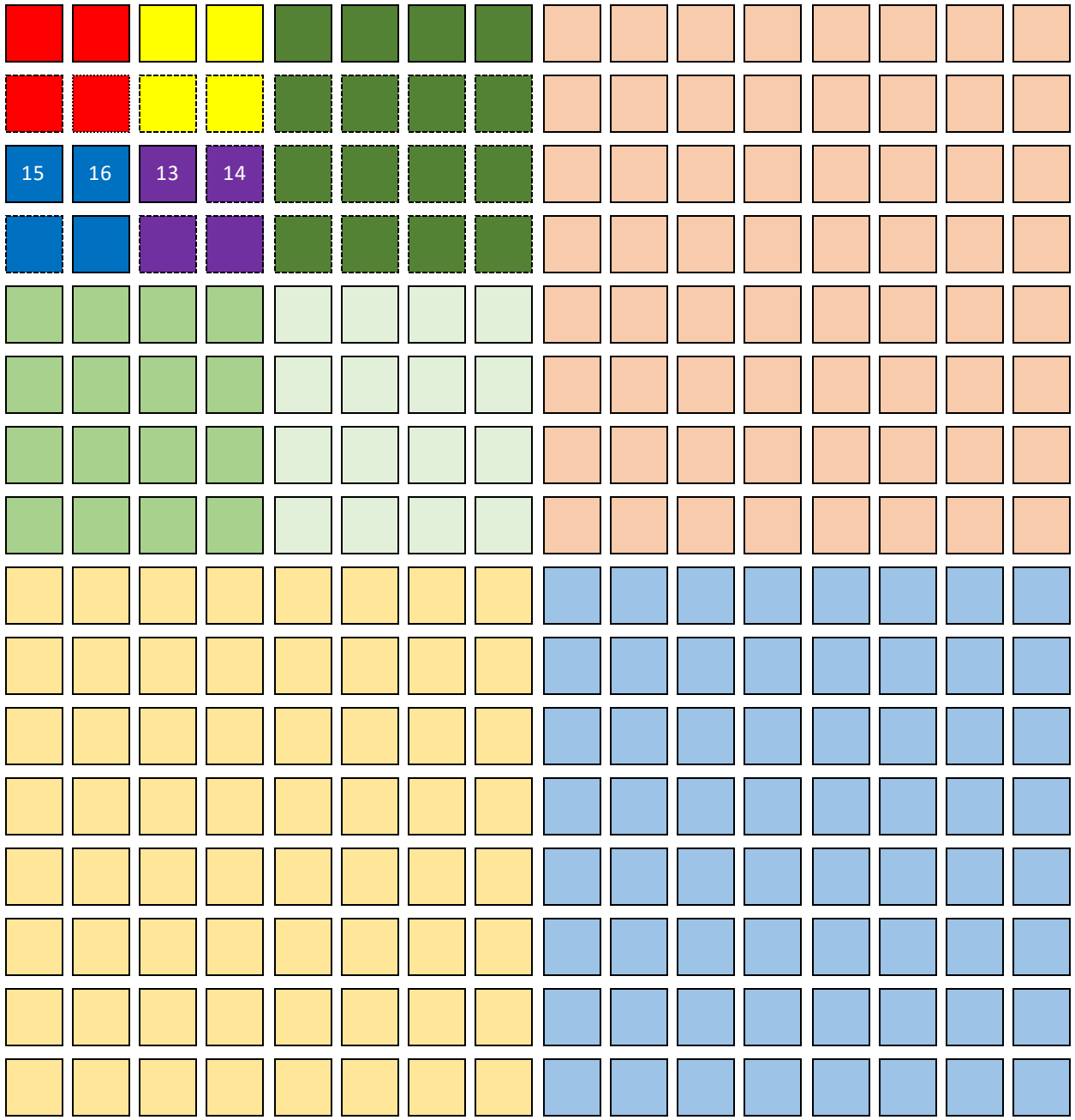
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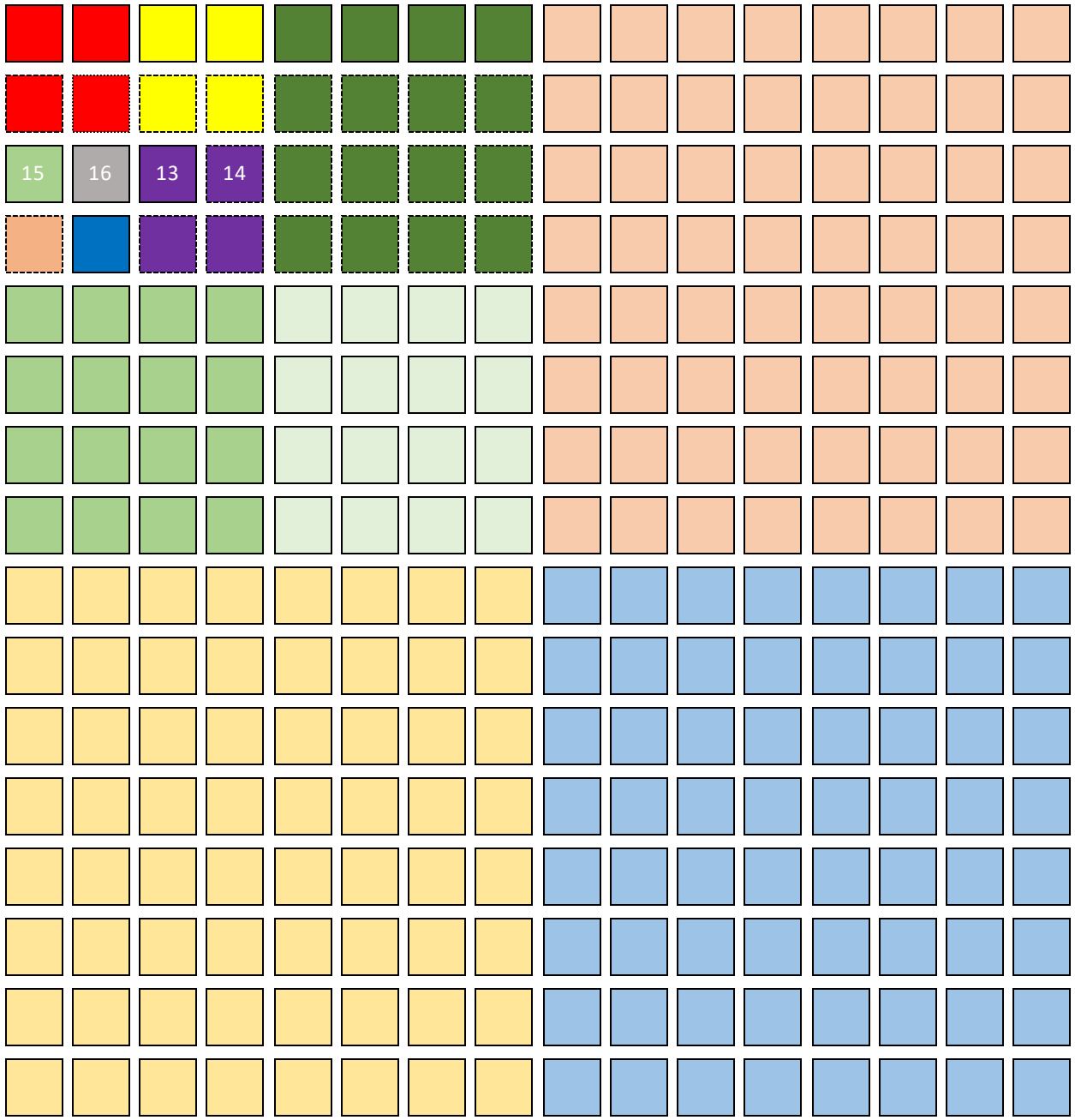
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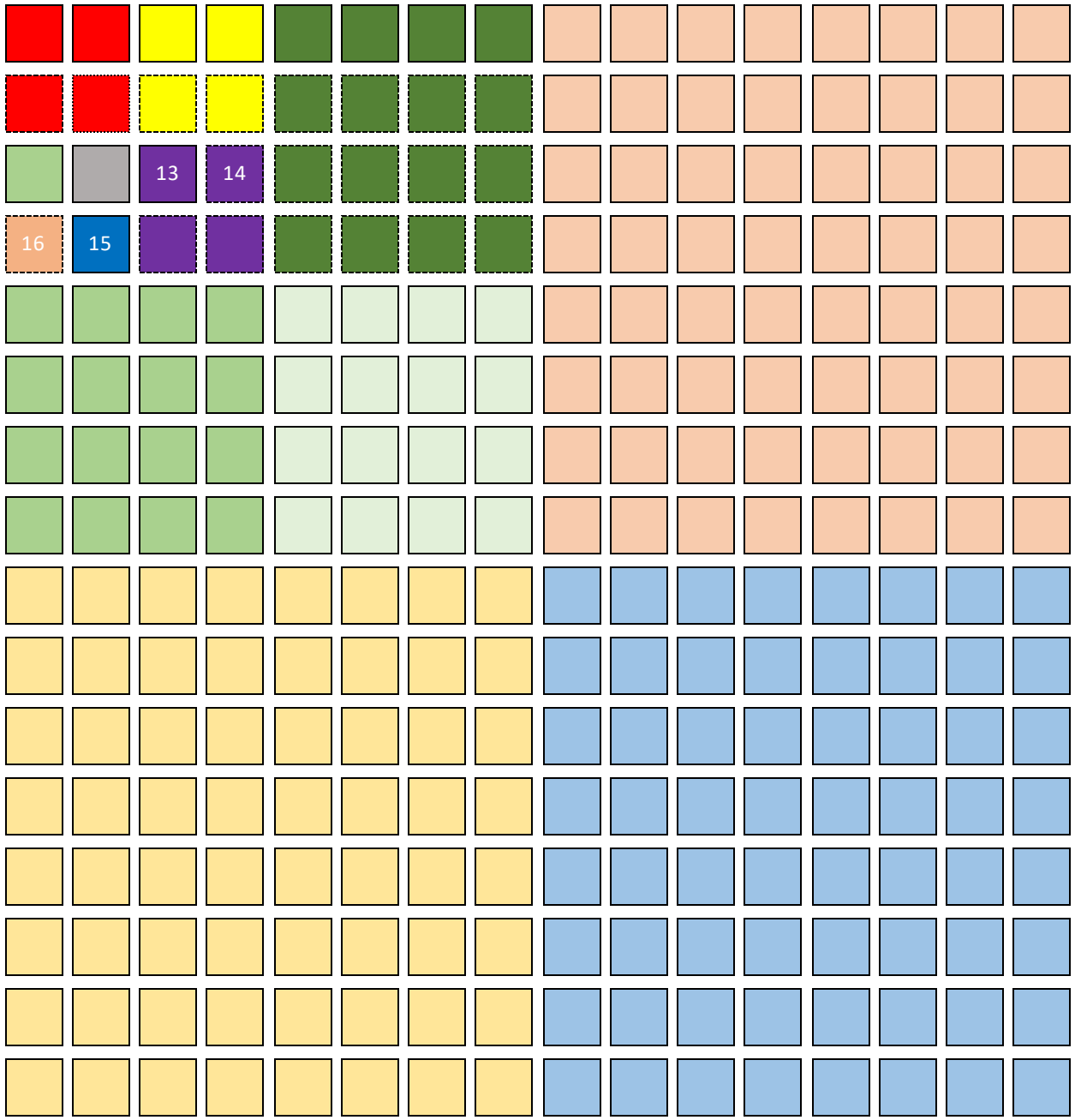
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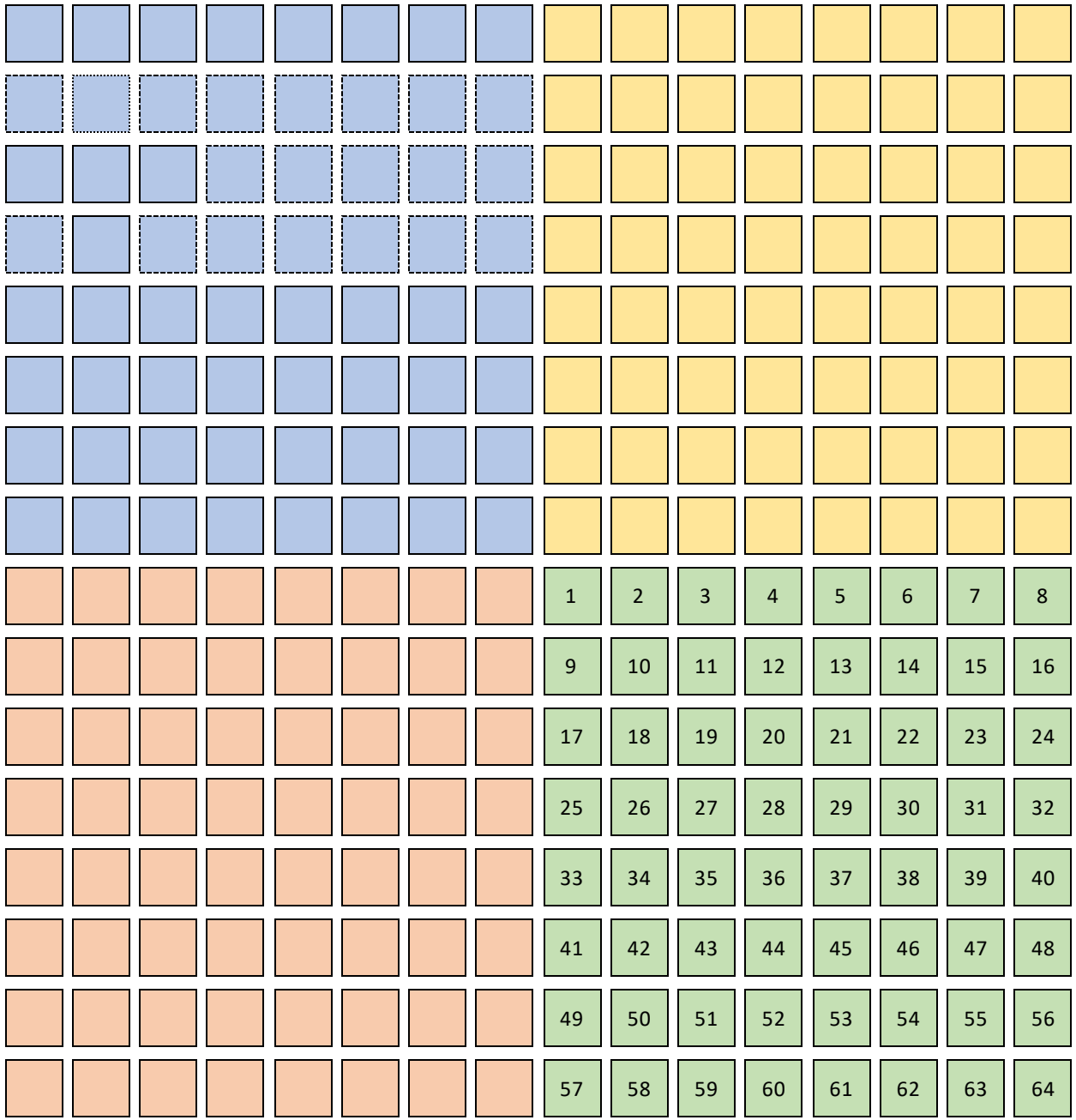
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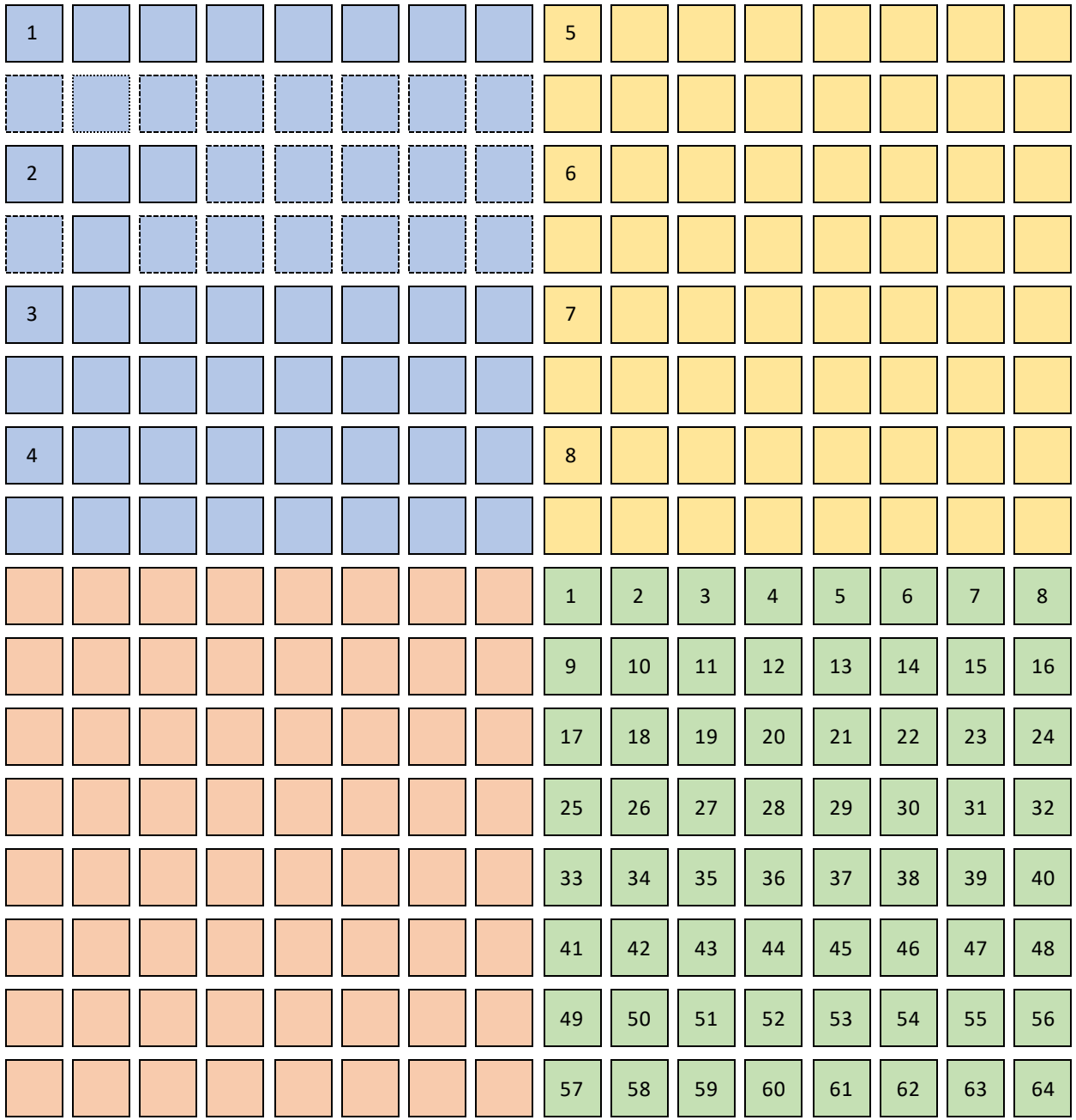
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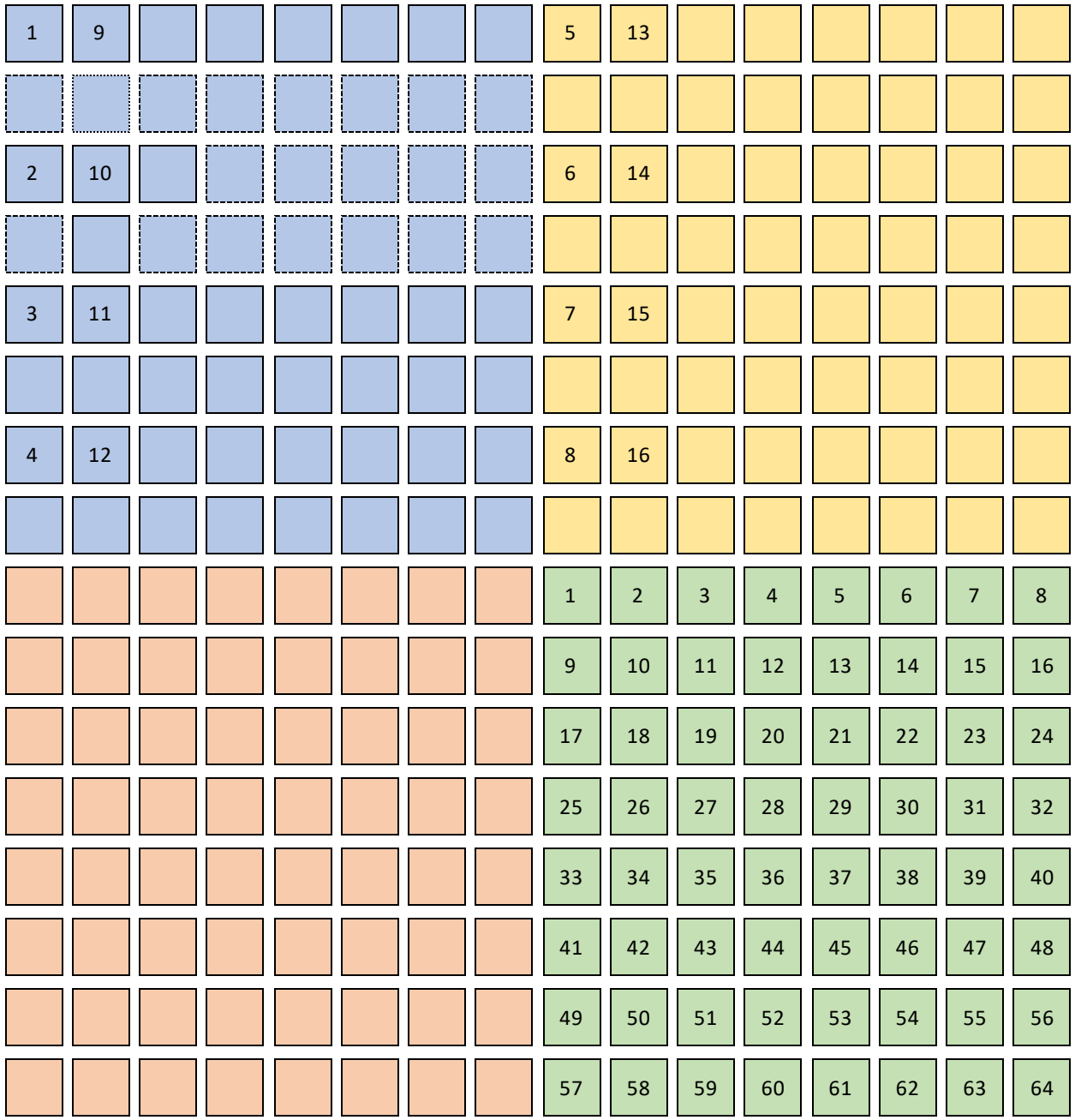
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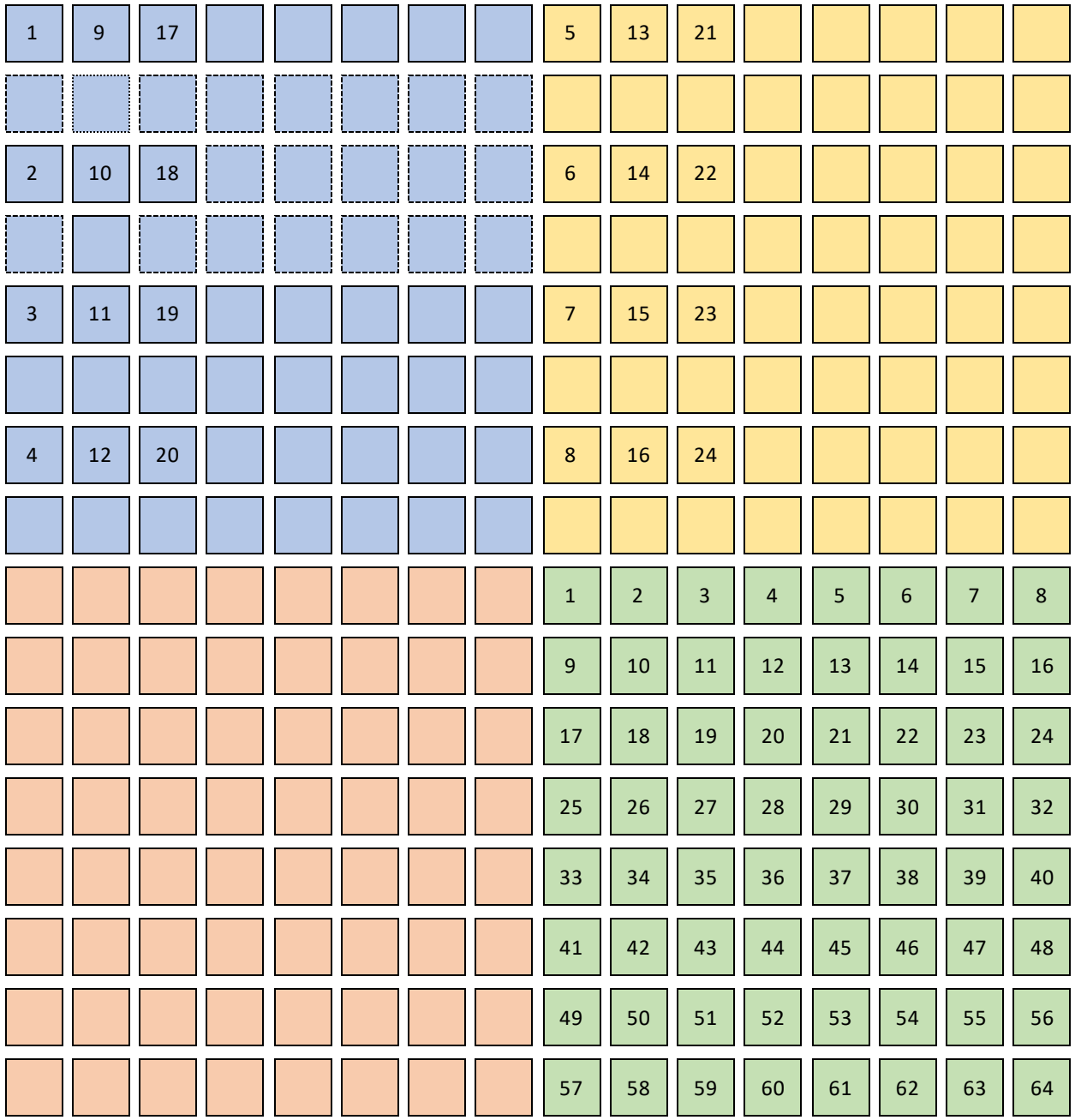
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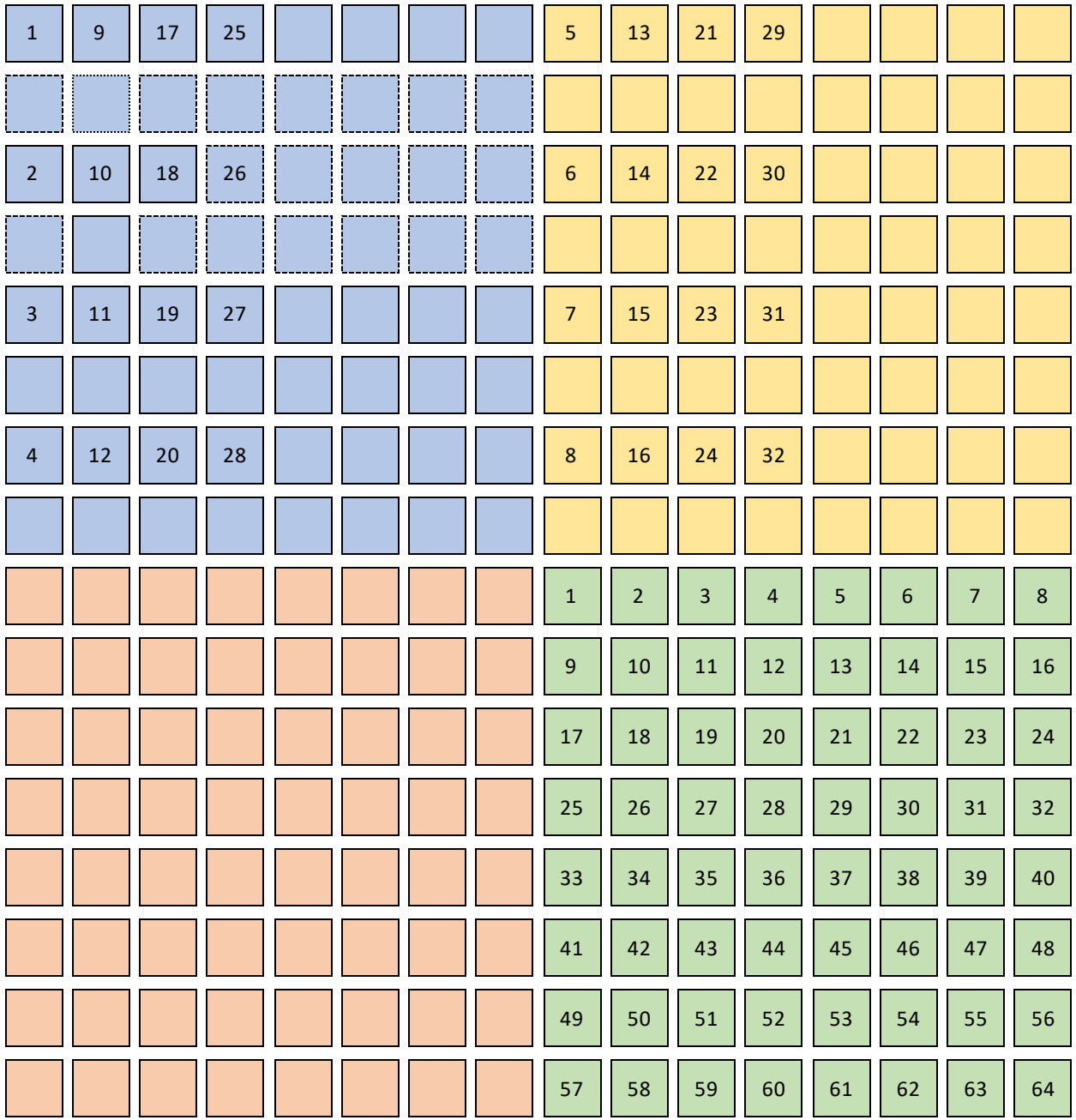
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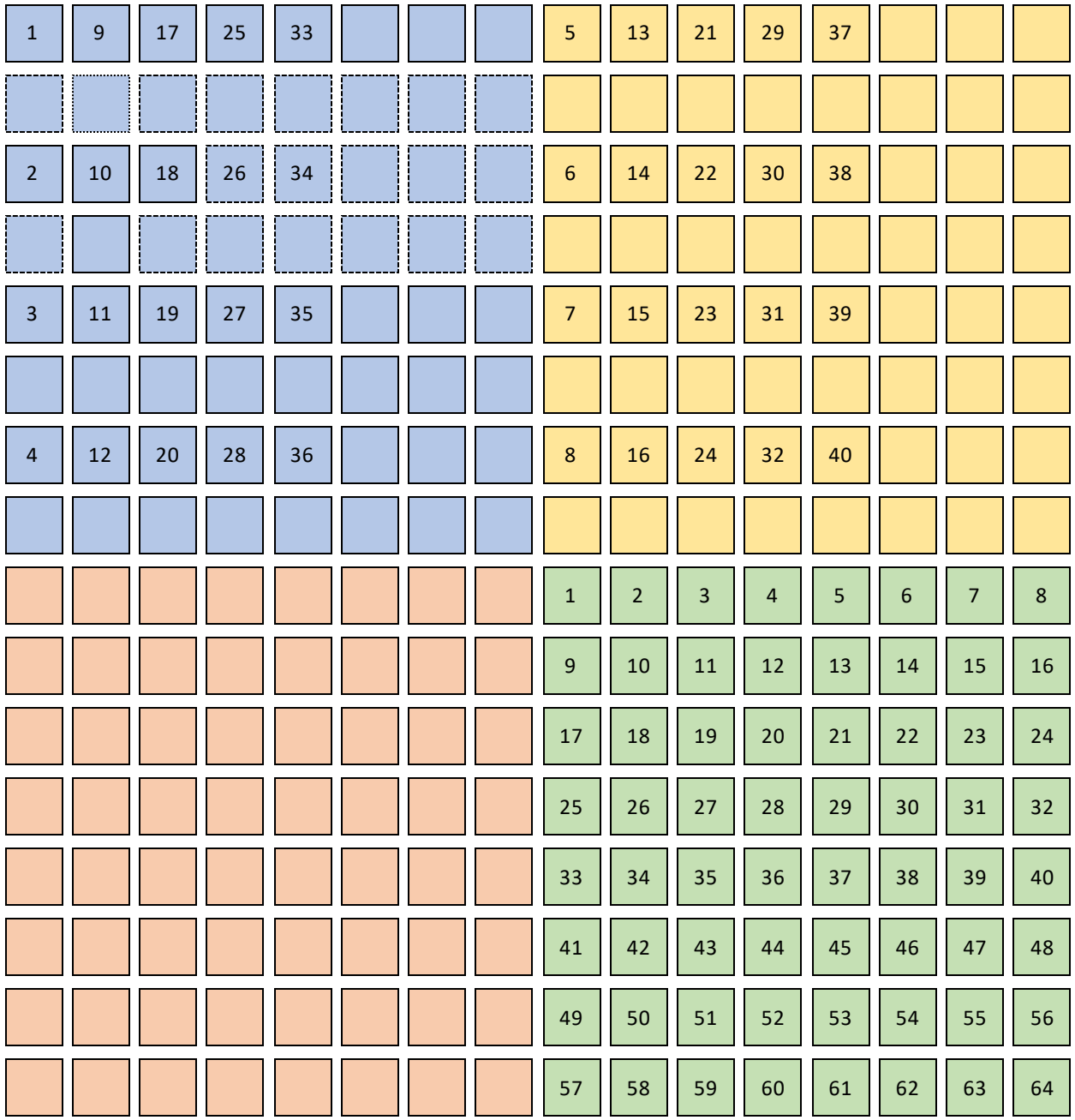
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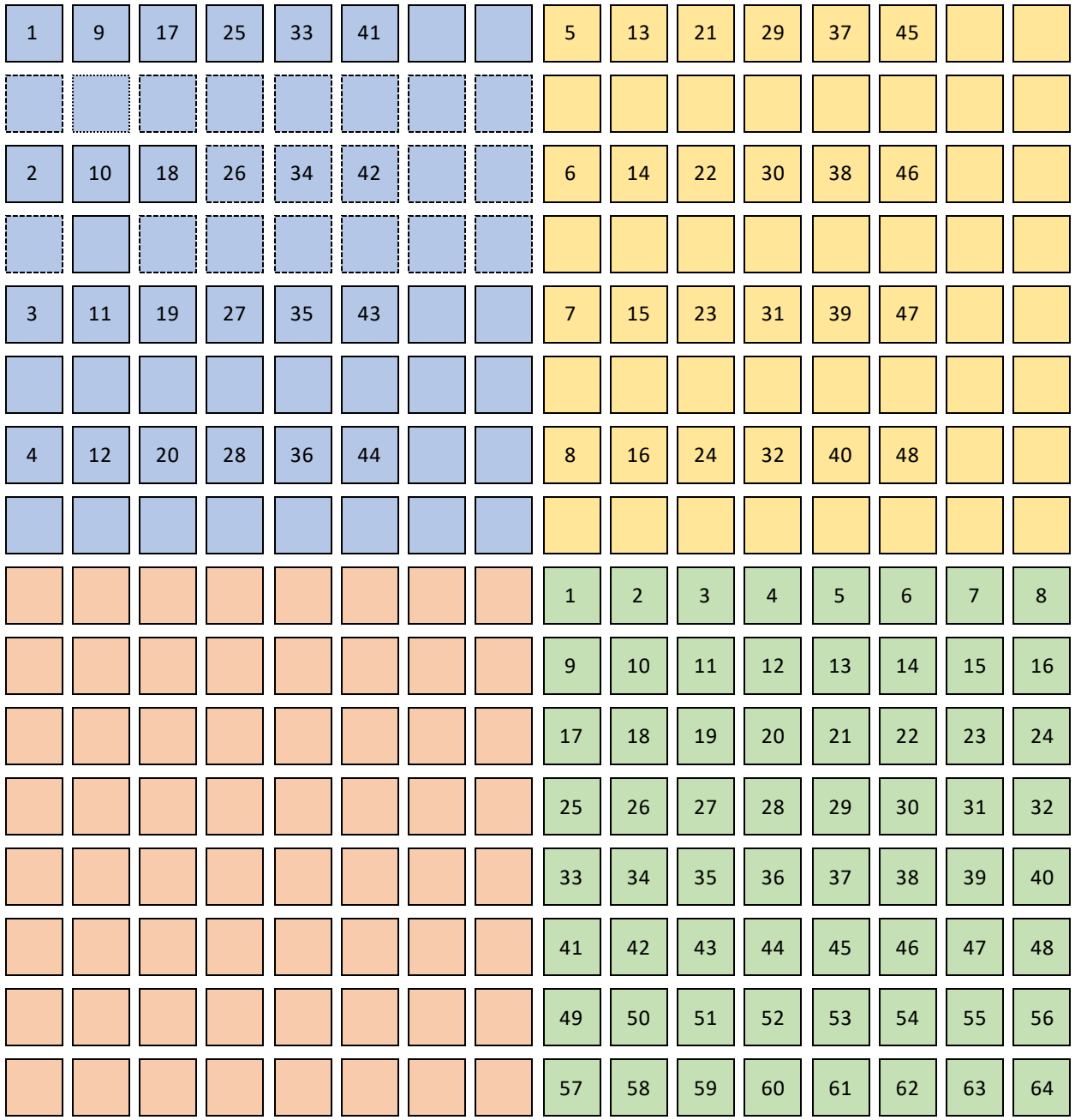
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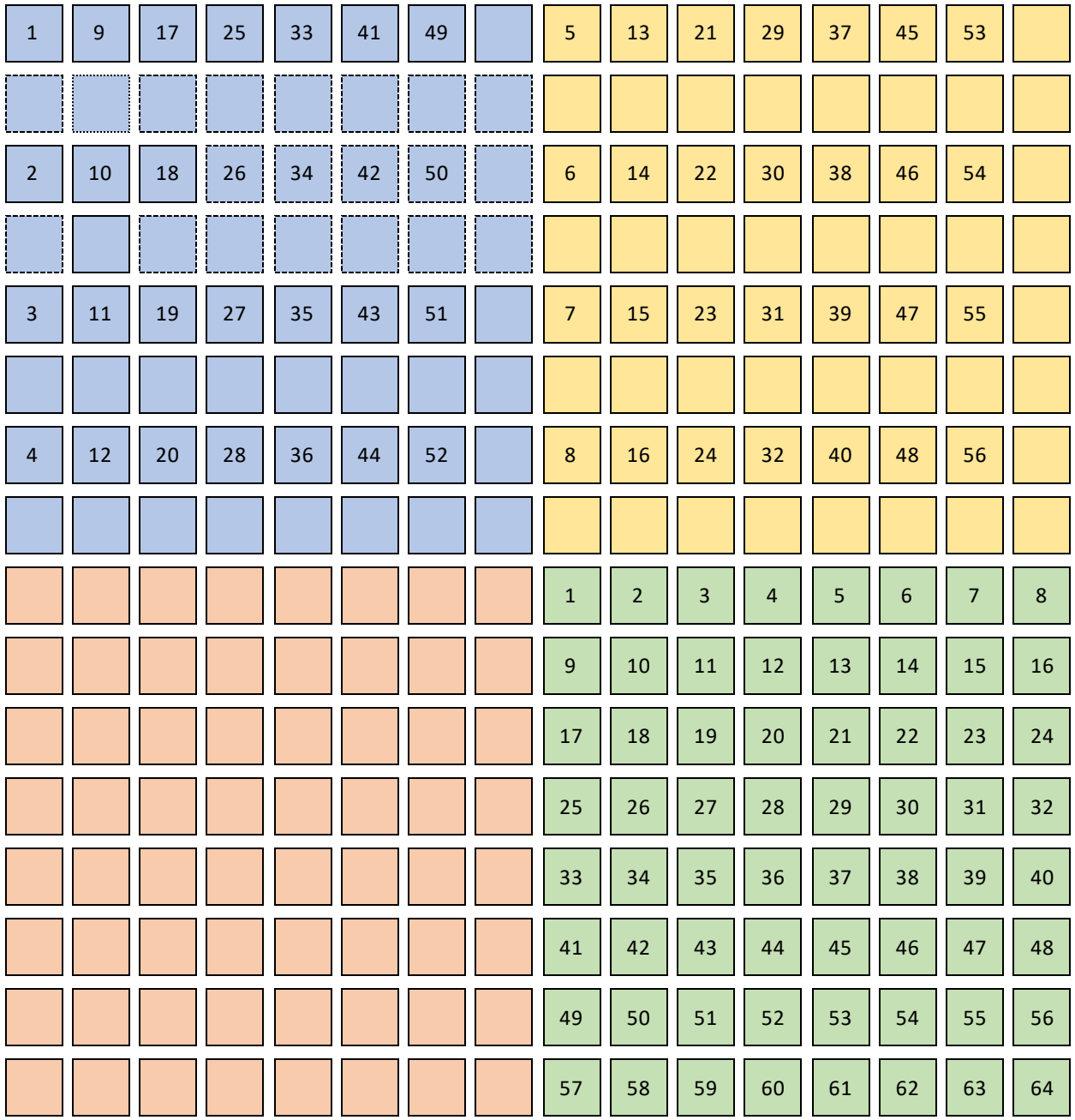
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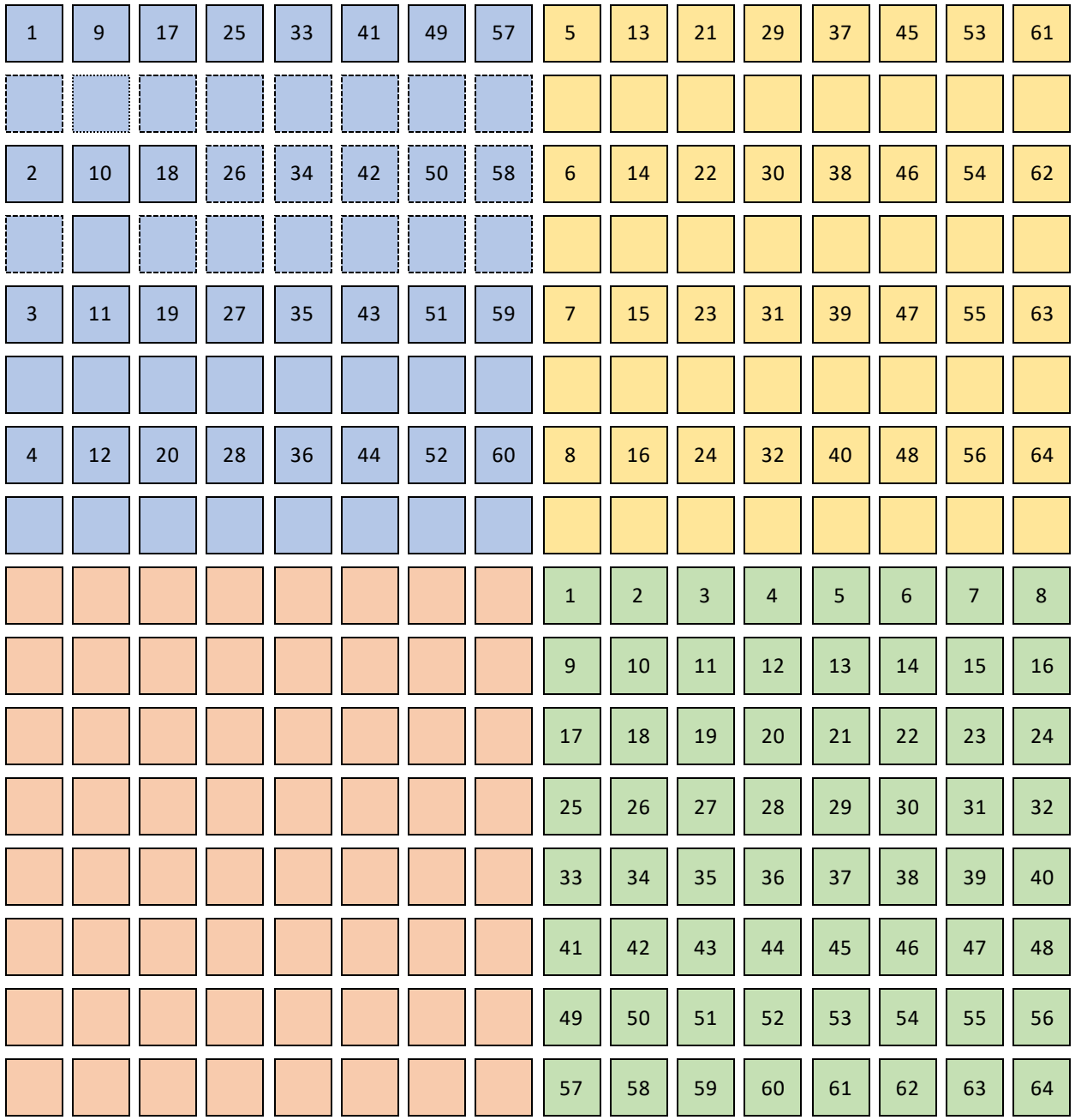
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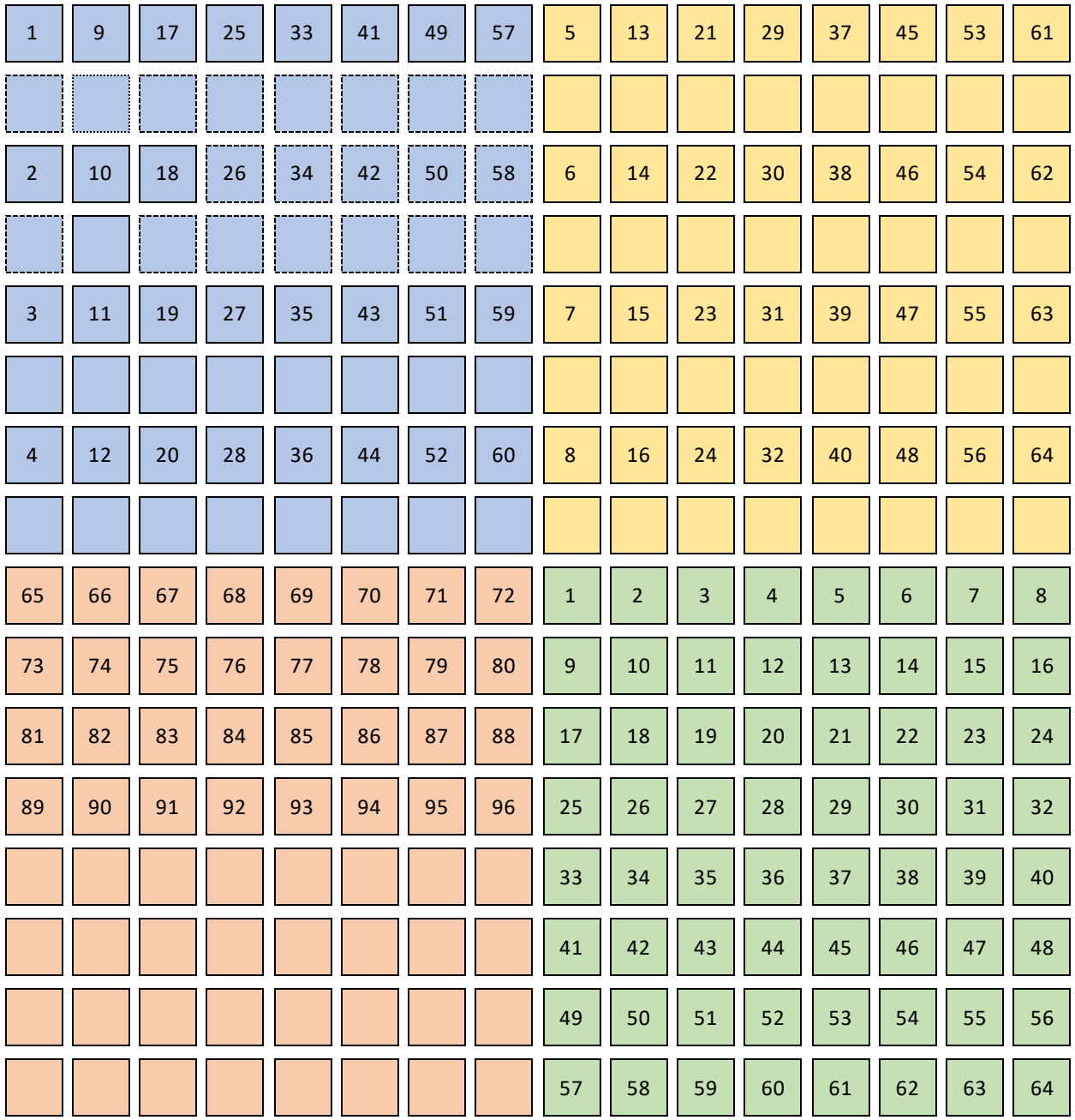
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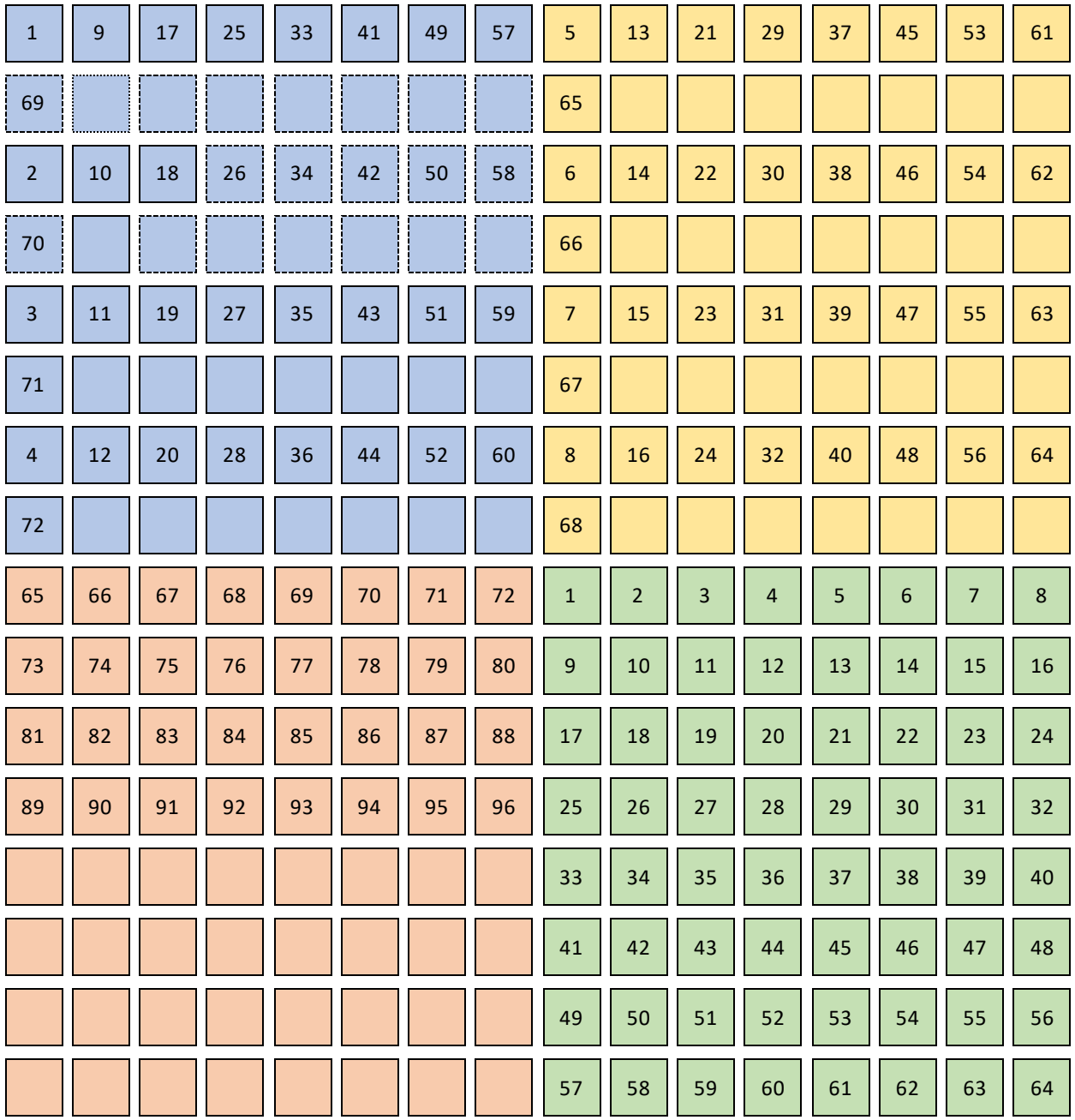
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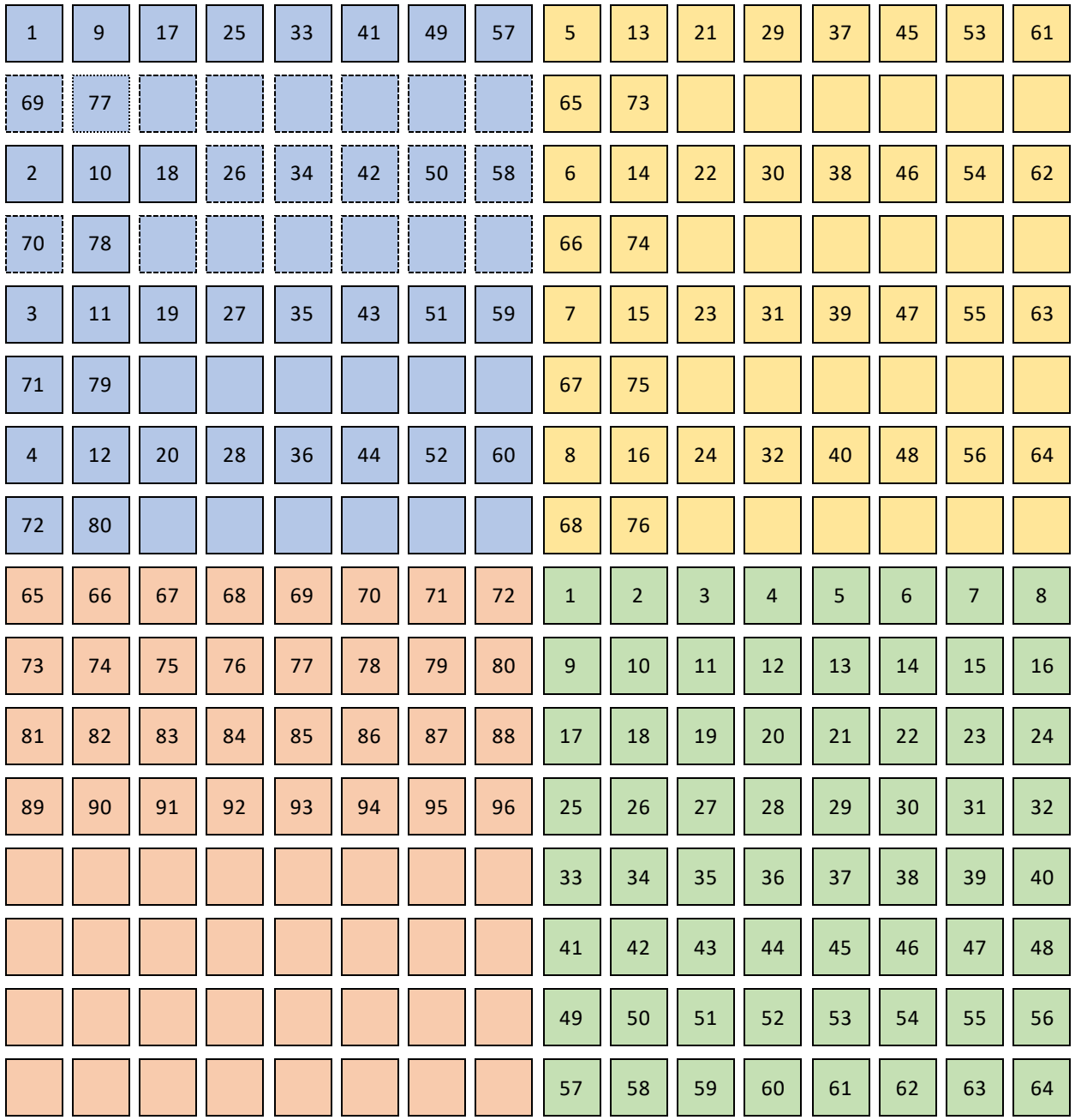
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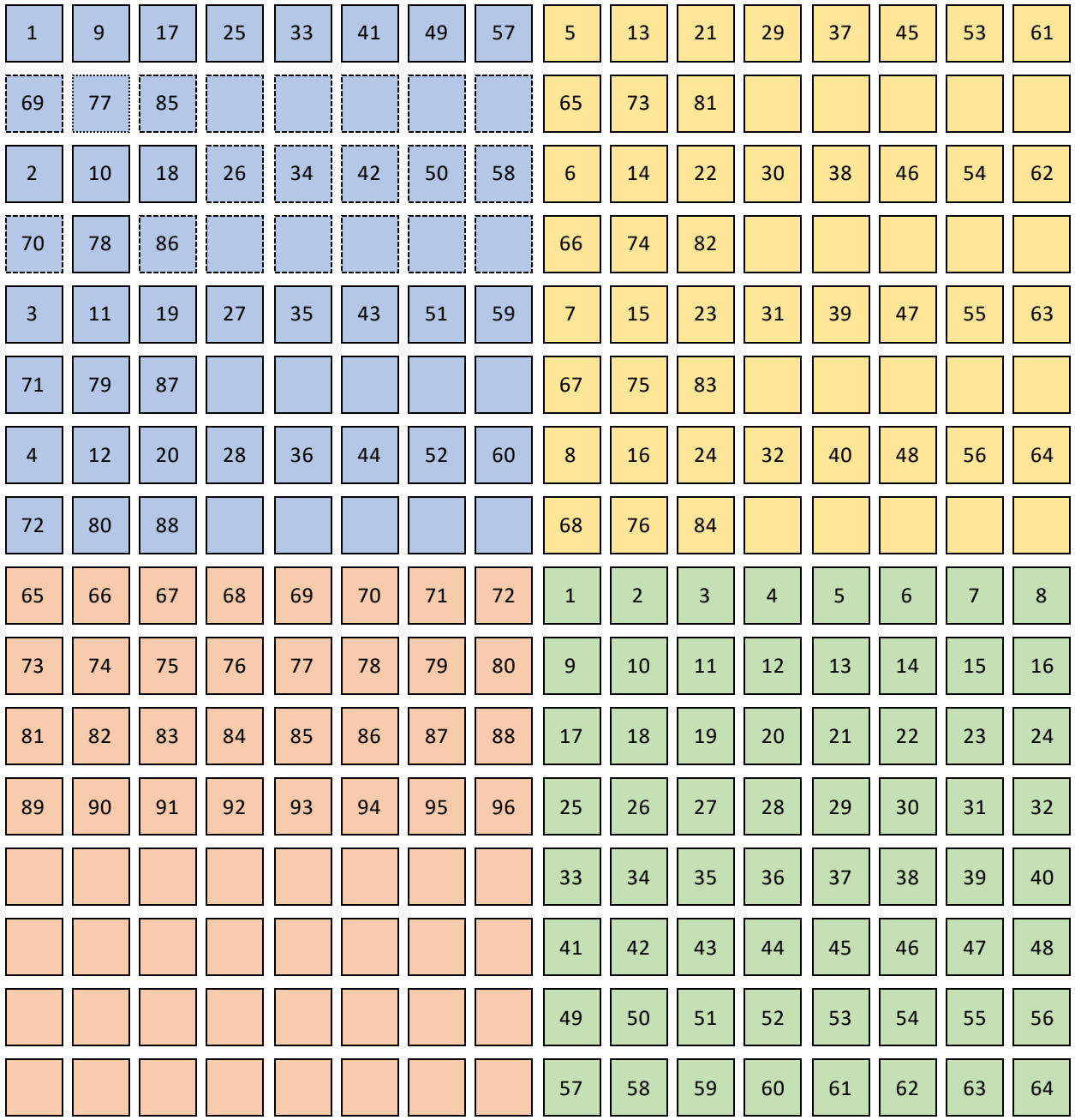
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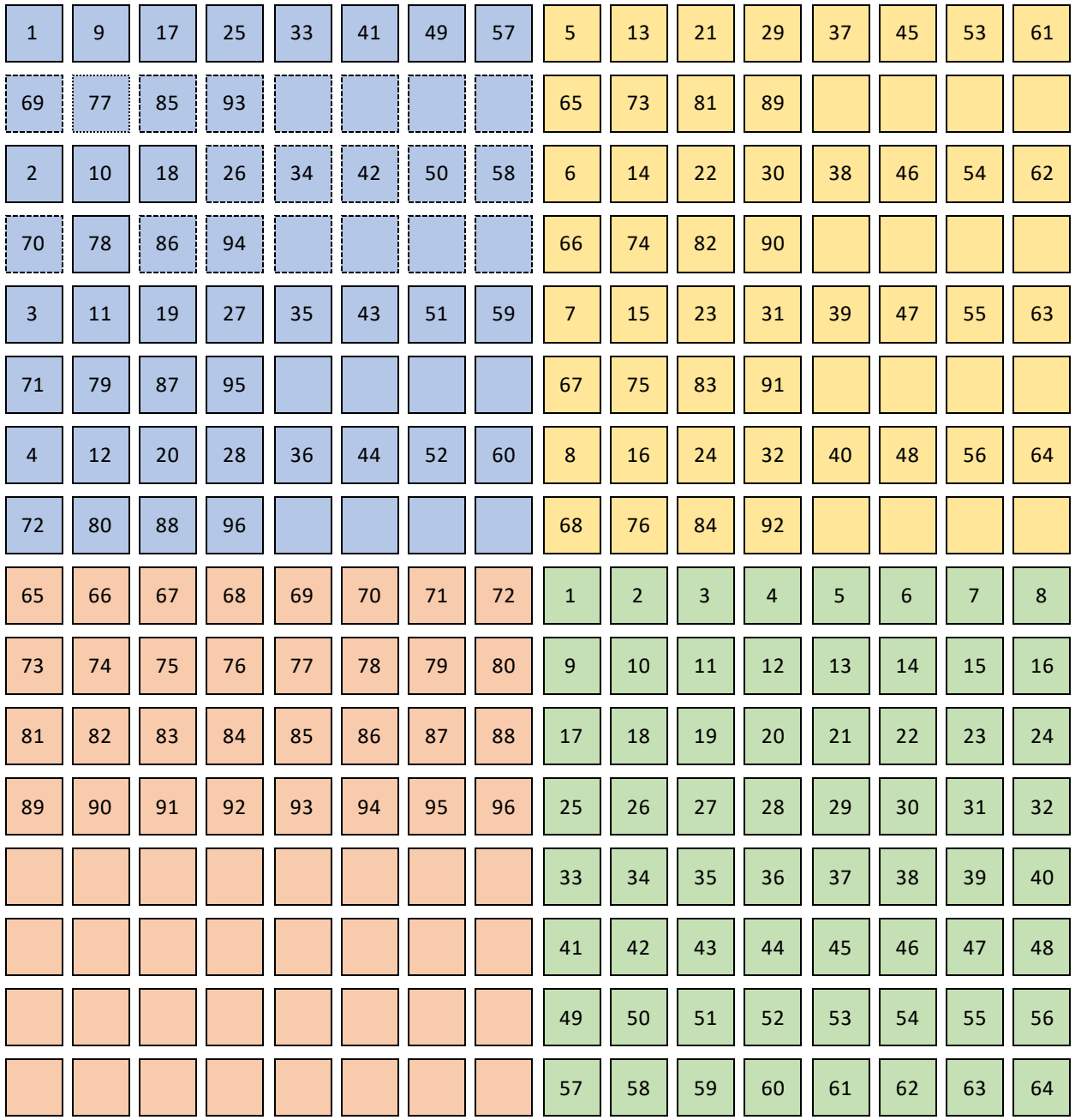
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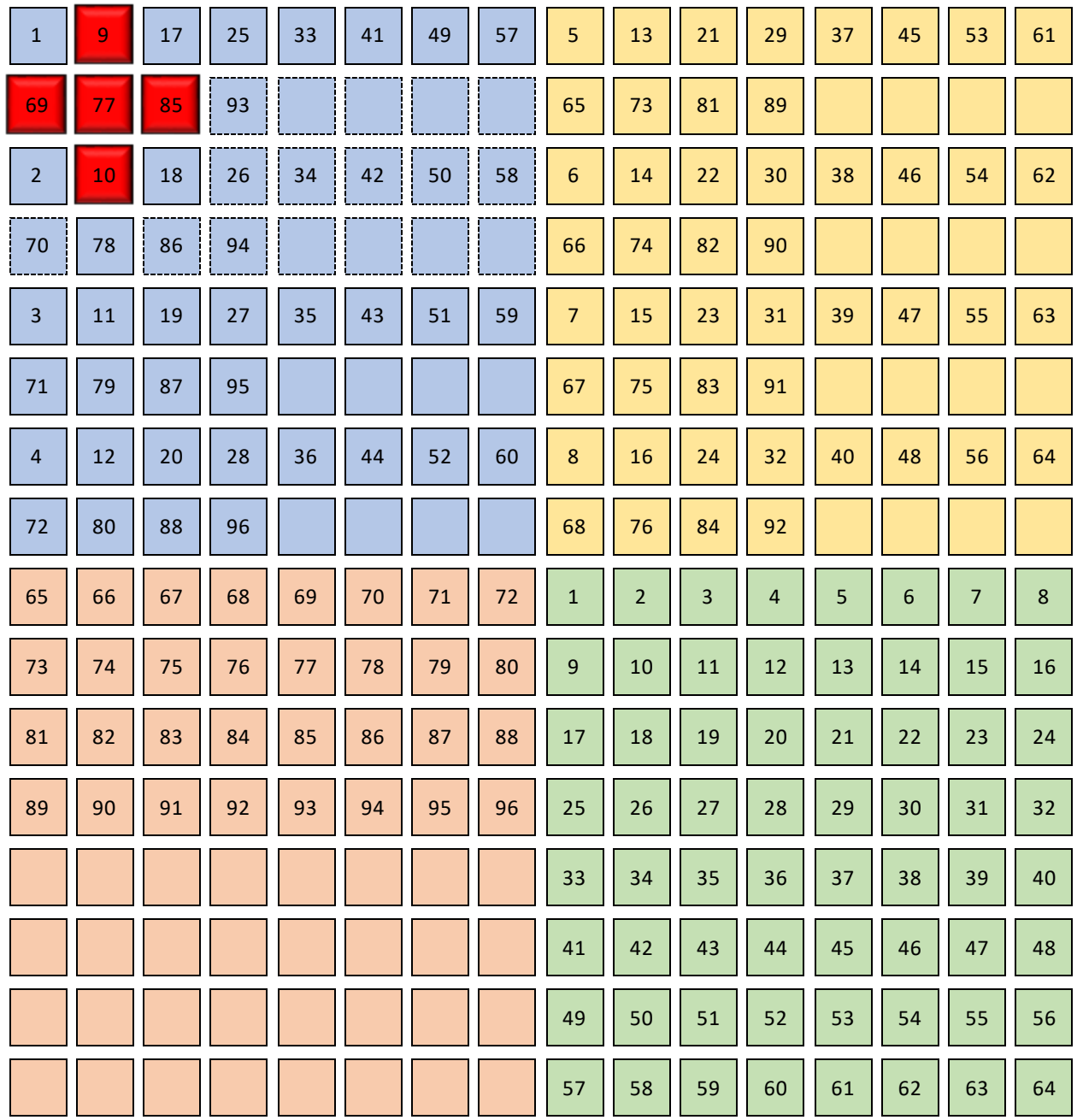
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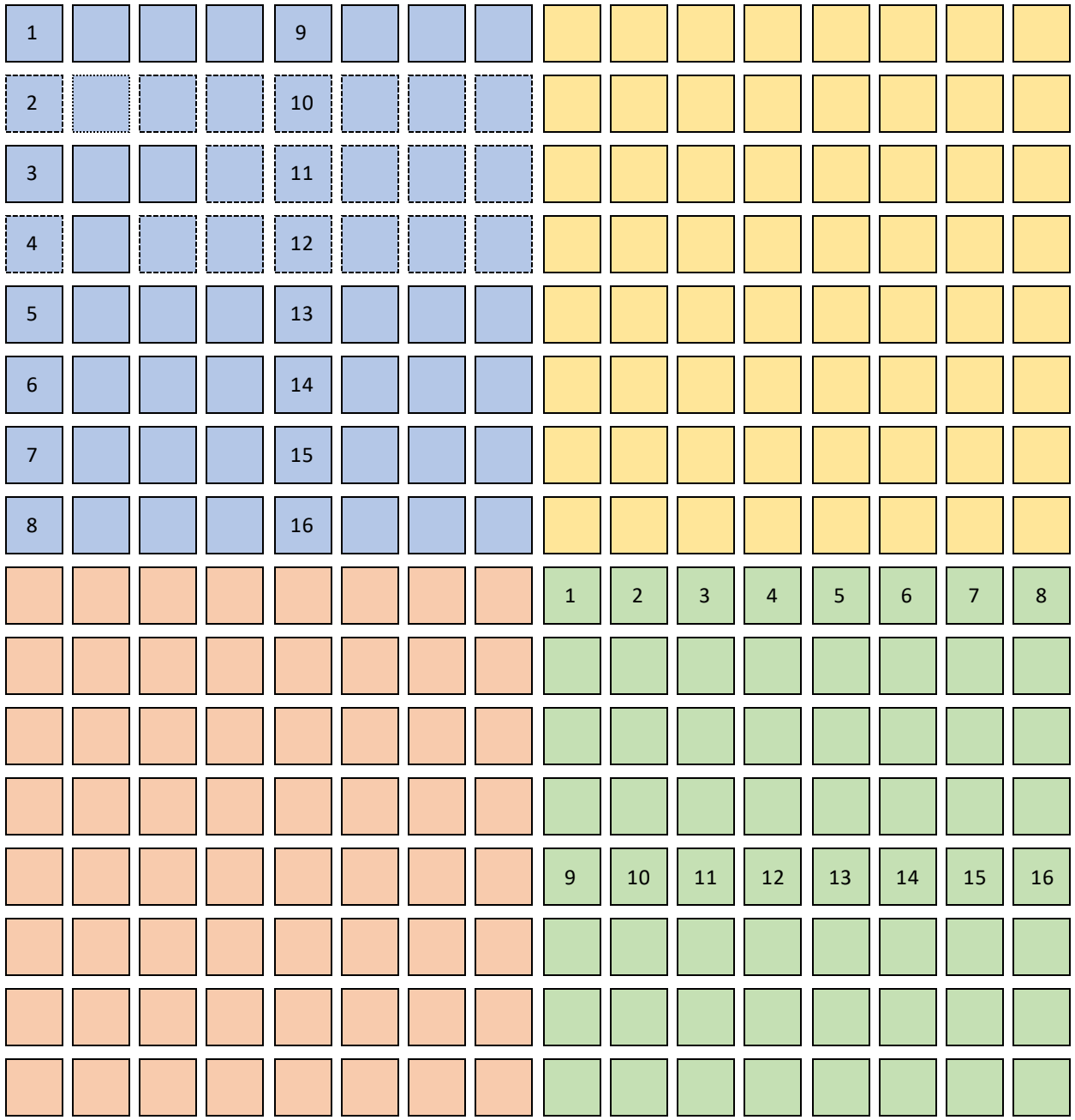
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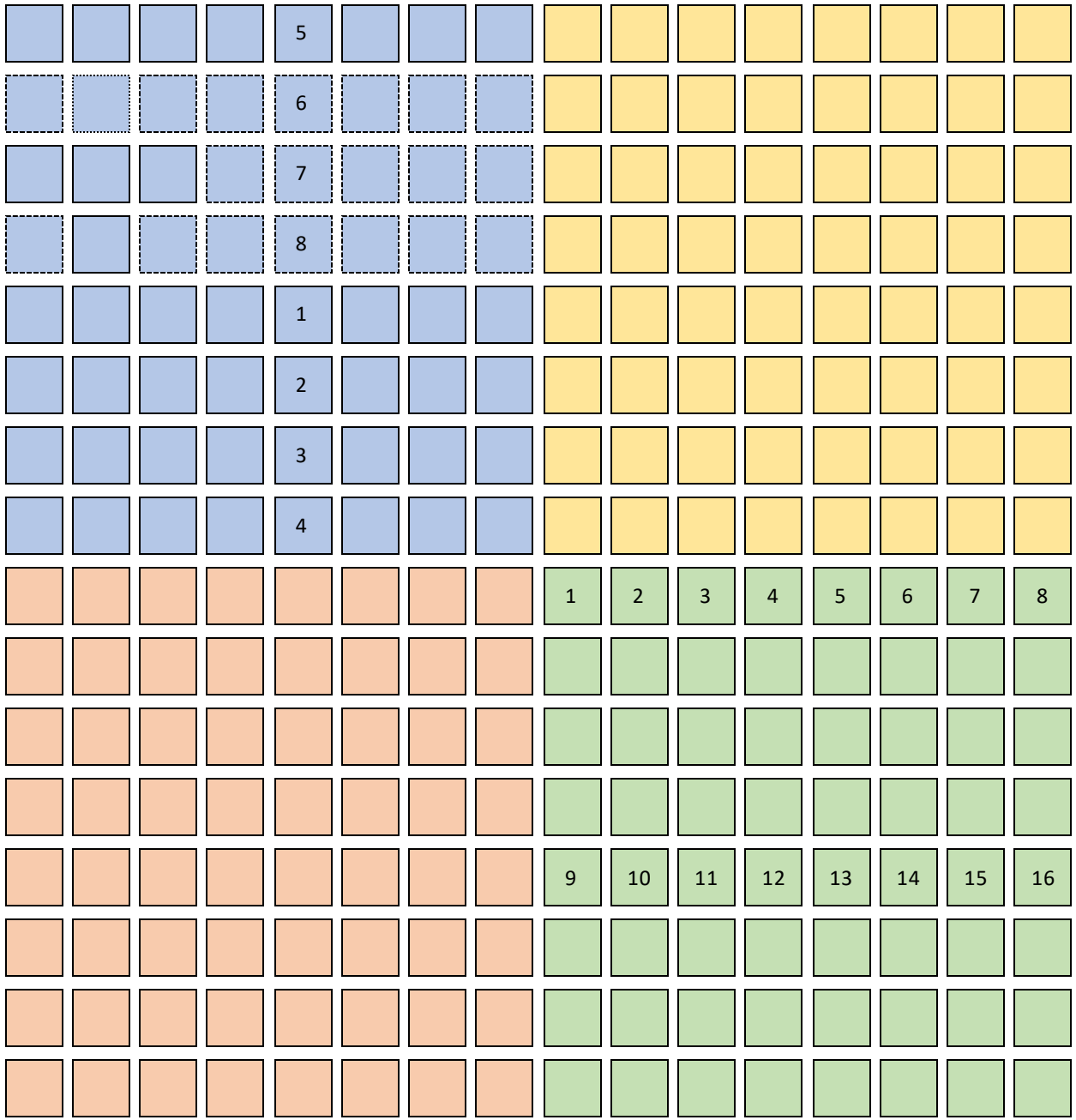
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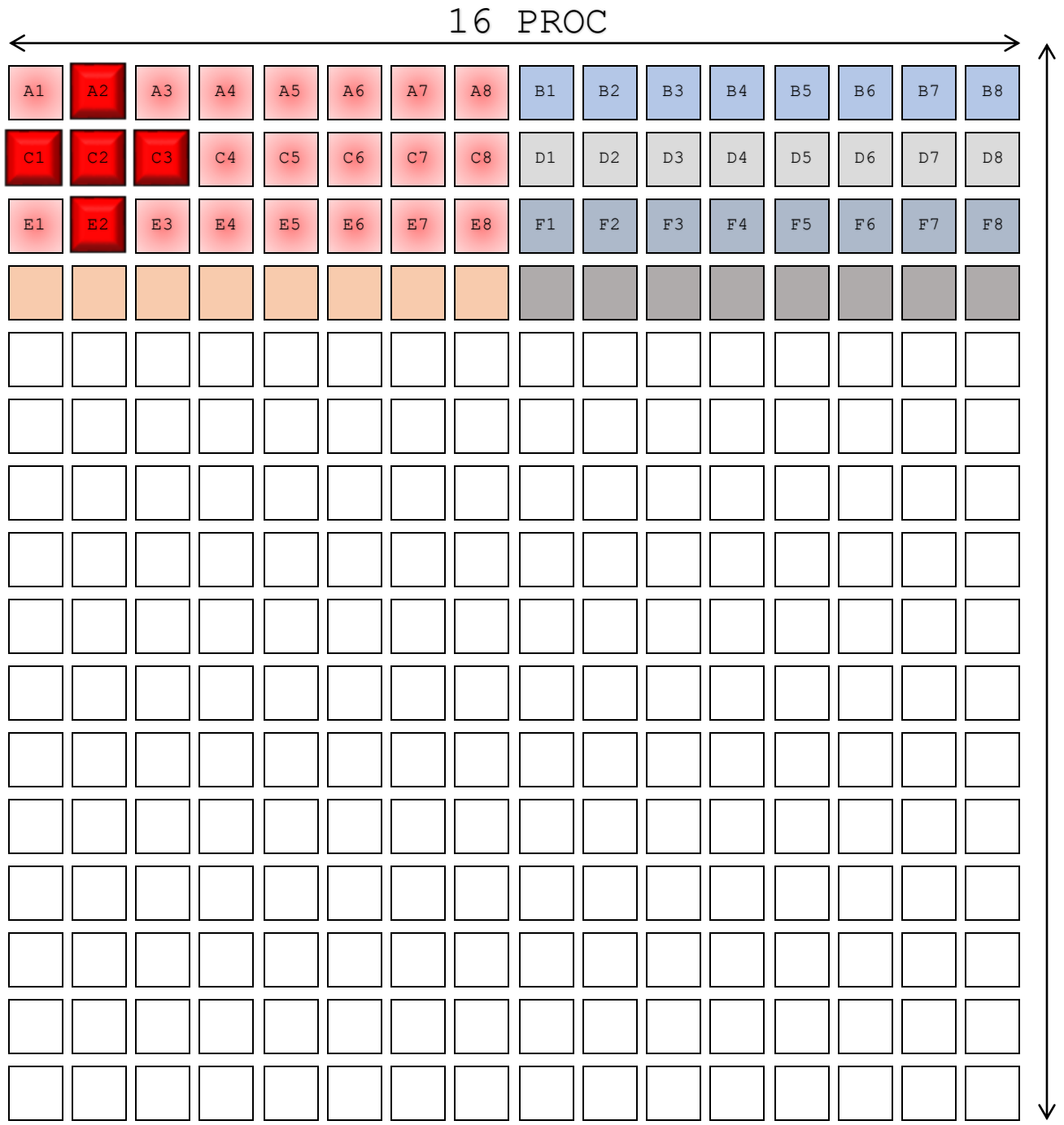


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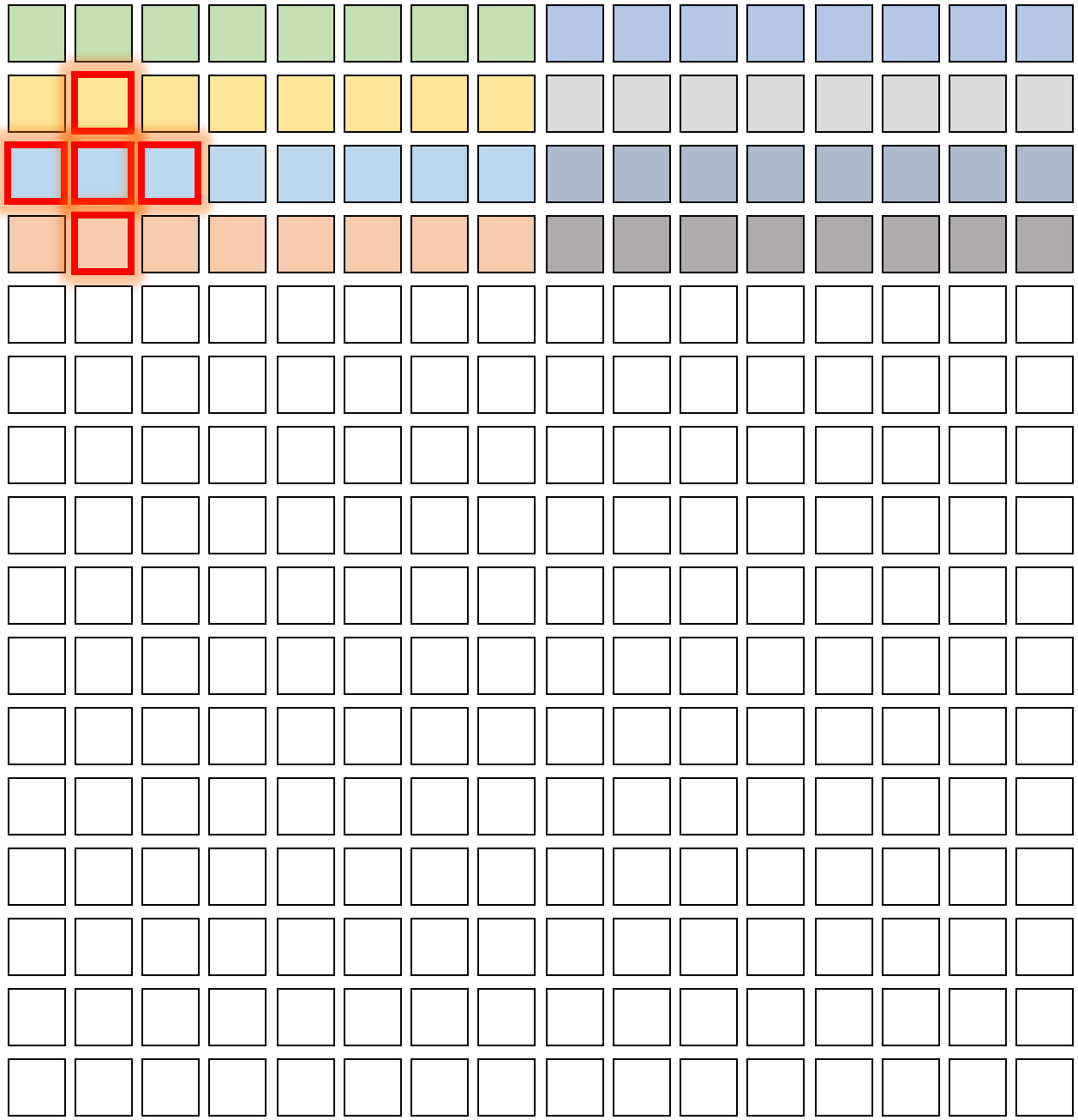
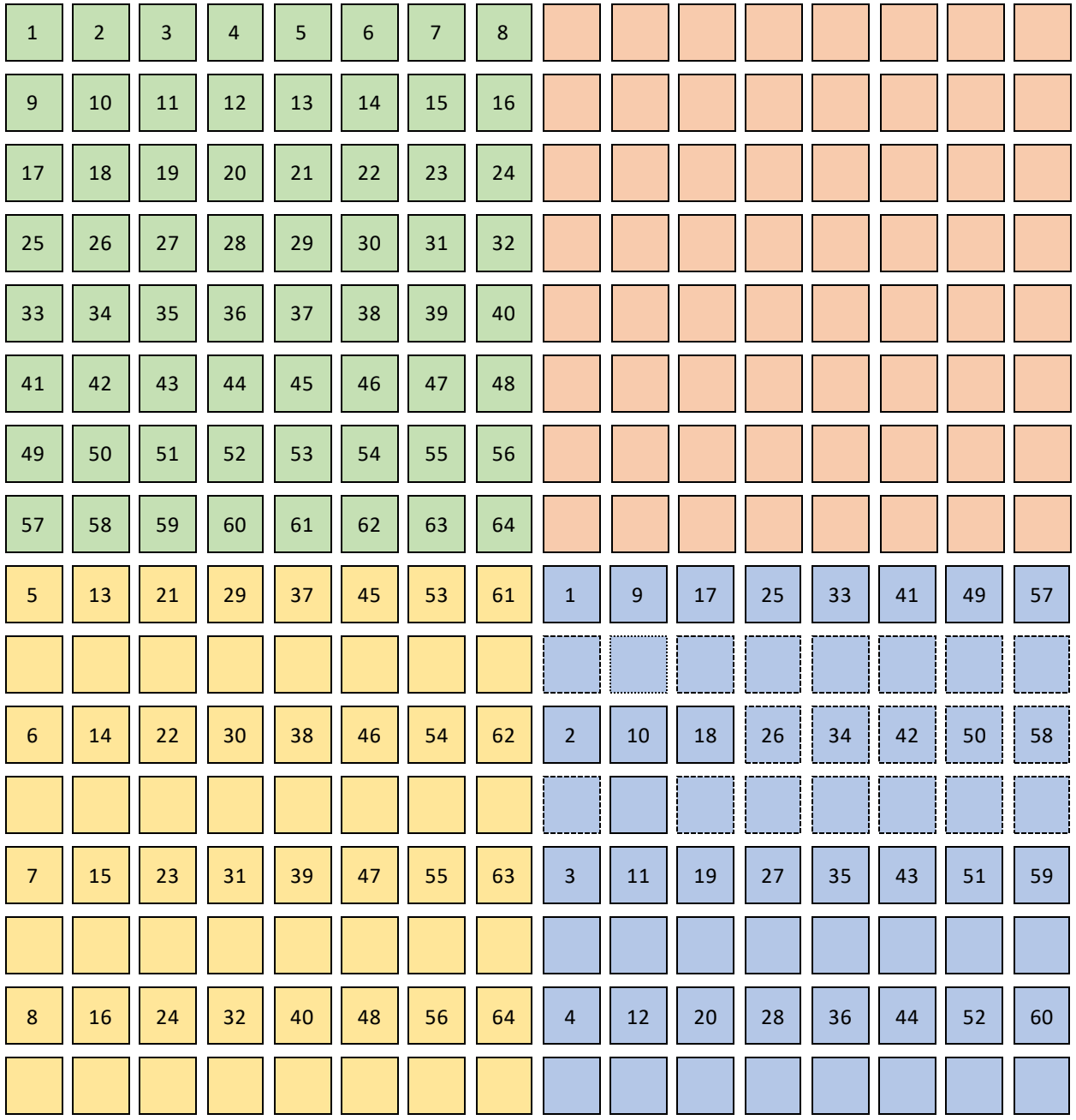
#!/bin/bash
#SBATCH --nodes=32 --ntasks-per-node=8
mpiexec ./heat_2d 8192 8192
```

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