



Decomposition

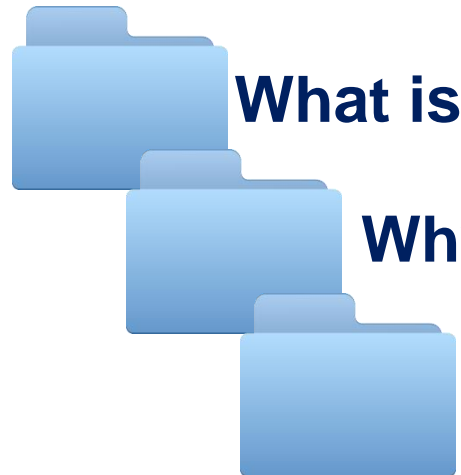
Lesson Objectives



At the end of this lesson, you should be able to:

- Describe the concept of decomposition
- Explain the importance of decomposition
- Decompose complex problems

Topic Outline

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- What is Decomposition?**
 - Why is Decomposition Important?**
 - How does Decomposition Help to Solve Problem?**

What is Decomposition?

Natural way to solve problems

→ **Decomposition** is the process of **breaking down** a complex problem into smaller manageable parts (subproblems).

- Each subproblem can then be examined or solved **individually**, as they are simpler to work with.

is also known as **Divide and Conquer**



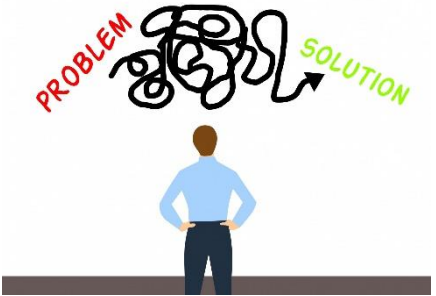
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Why is Decomposition Important?

- **Solve complex problems**

- If a complex problem is not decomposed, it is much harder to solve at once. Subproblems are usually easy to tackle.



- **Enable collaboration and teamwork**

- Each subproblem can be solved by different parties.

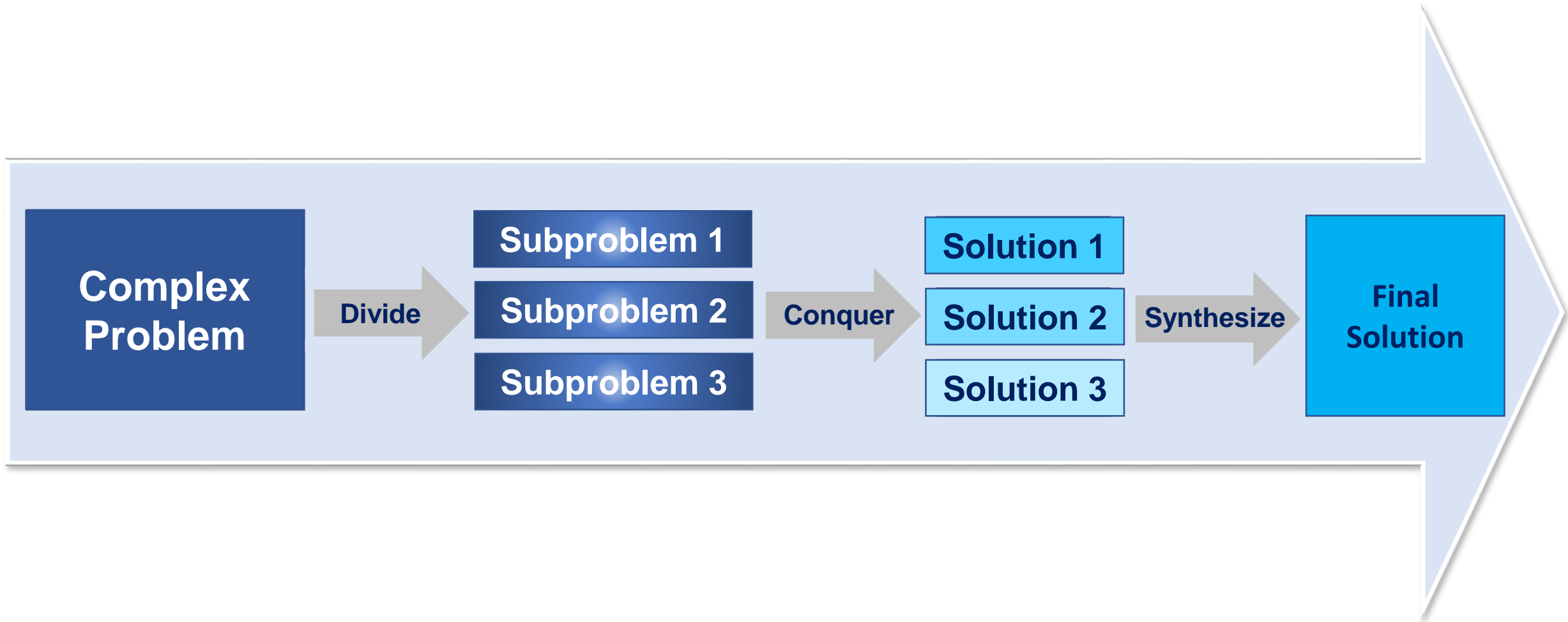


- **Analysis**

- Decomposition forces you to analyze your problem from different aspects



How does Decomposition Help to Solve Problems?



Example



How do you calculate the result of
 $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10$?

**Complex
Problem**

$$1 + 2 + 3 + 4 + \\ 5 + 6 + 7 + 8 + \\ 9 + 10 = ?$$

**Divide the
problem into five
subproblems**

- $1 + 10$
- $2 + 9$
- $3 + 8$
- $4 + 7$
- $5 + 6$

**Conquer each
subproblem**

Solution to each
subproblem: 11

**Synthesize the
final solution**

$$11 * 5 = 55$$



How do you calculate the result of $1 + 2 + 3 + \dots + 98 + 99 + 100$?





Answer

Result: $101 * 50 = 5050$

In this lesson, we have learned:

- What decomposition is
- The importance of decomposition
- How to apply decomposition

References for Images

No.	Slide No.	Image	Reference
1	5		Problem Puzzle [Online Image]. Retrieved June 27, 2018 from https://www.maxpixel.net/Concept-Problem-Puzzle-3d-Render-Solve-Jigsaw-2636254 .
2	6		Problem Solved [Online Image]. Retrieved June 27, 2018 from https://www.publicdomainpictures.net/en/view-image.php?image=238047&picture=problem-solved .
3	6		Teamwork [Online Image]. Retrieved June 27, 2018 from https://pixabay.com/en/teamwork-together-objectives-create-3276694/ .
4	6		Bright Contemplation [Online Image]. Retrieved June 27, 2018 from https://pixabay.com/en/bright-contemplation-idea-1296538/ .