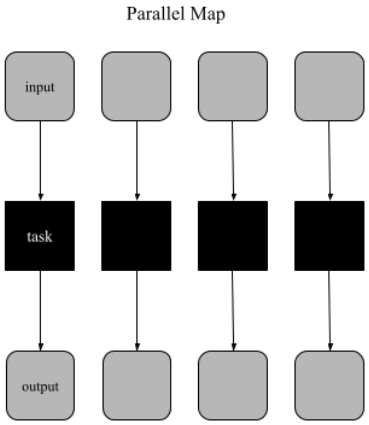
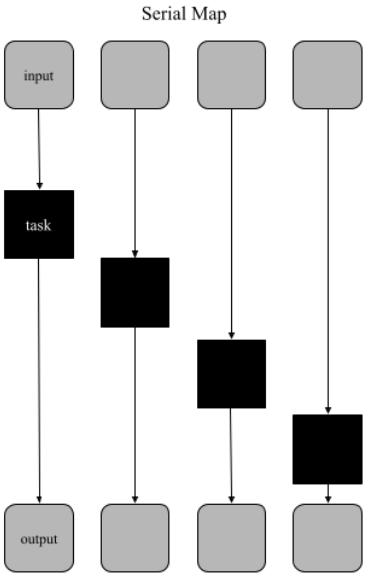
Pattern 1 - Map

One simple parallel pattern is **map**.





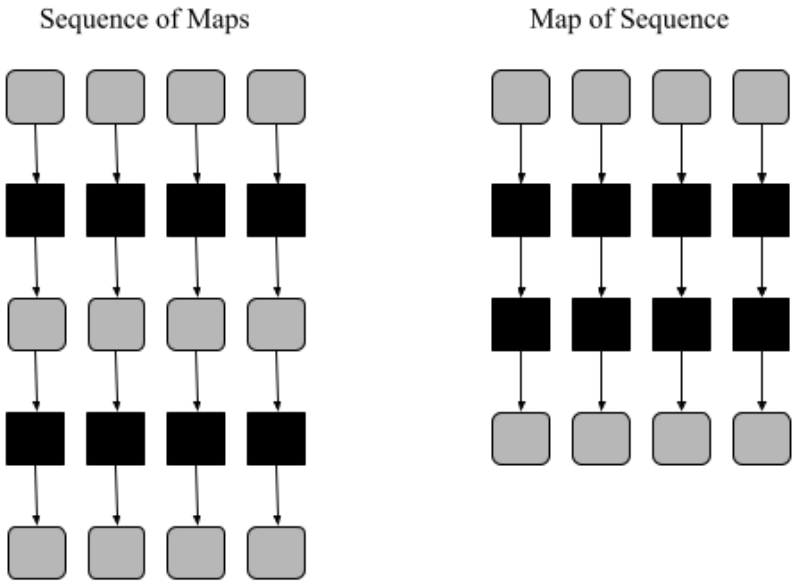
In **map**, there exists two components: a **collection** of elements and an **elemental function**. Map runs instances of the elemental function (a task) on each element of the collection. In the world of serial programming, this is synonymous to a for loop in which every iteration is independent of other iterations. Thus, the elemental function should be pure in that it does not modify global data that its instances rely on. If this purity is maintained, map is deterministic (its output should always be the same whenever it is run).

Below is a list of topics where maps are often used to improve performance.

- Scaled Vector Addition (SAXPY)
- Mandelbrot Set
- Gamma Correction
- Image Thresholding
- Color Space Conversions

- Monte Carlo Sampling
- Ray Tracing

Furthermore, if one has many map patterns occurring in sequence, combining the elemental functions into just one map should be considered! This process, called **code fusion**, improves performance.



The map of a sequence is conventionally more efficient that a sequence of maps.