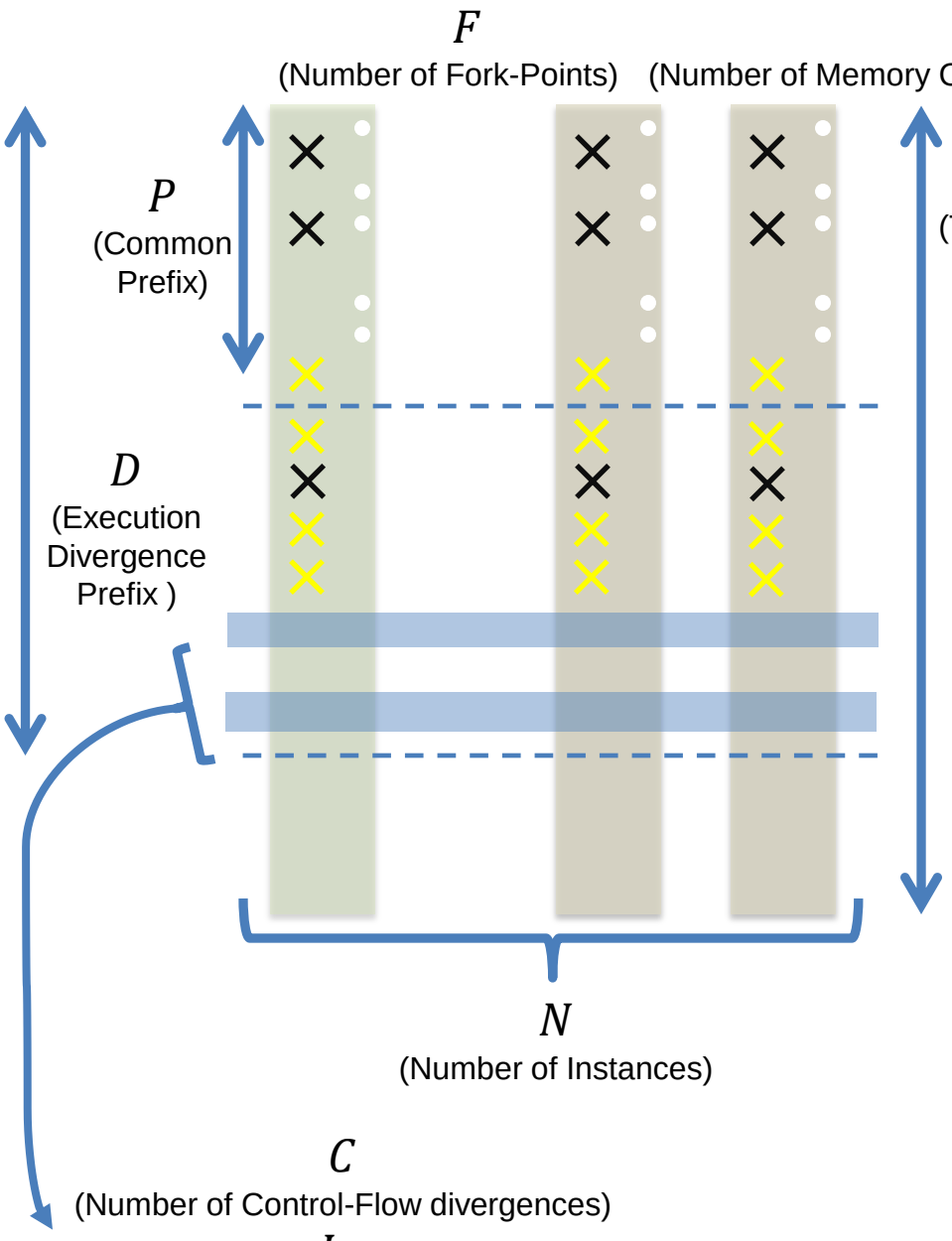

Key

- memory op/system call
- control flow divergence
- fork-point

Without Silhouette Execution:

Total # of Instructions to be executed $T_O = NI$

With Silhouette Execution:

Total # of Instructions to be executed $T_S =$

$$(I - D)N + (1 + k1)P + (1 + k2)(D - P) + k3(N - 1)F + k4(N - 1)M + k5\ N\ C\ L_C$$

$(I - D)N$ instructions are executed by all instances after silhouettes branch off completely.

$(1 + k1)P$ instructions are executed by leader in the common prefix. $k1$ is a constant that represents dynamic instrumentation overhead from identifying fork points and recording the execution signature.

$(1 + k2)\ (D - P)$ instructions are executed by leader after the common prefix but before the control flow divergence. $k2$ is a constant that represents dynamic instrumentation overhead from identifying fork points and recording the execution signature *and dynamic taint propagation.*

$k3\ (N - 1)\ F$ instructions are executed by the silhouettes at forking instructions to determine whether execution has diverged or not. $k3$ represents overhead.

$k4\ (N - 1)\ M$ instructions are executed by the silhouettes in emulating system calls and memory operations between fork-points. $k4$ represents overhead.

$k5\ N\ C\ L_C$ instructions are executed by the instances when control flow diverges in order to record execution stages and use them to reconcile execution. $k5$ represents overhead.