

Oblig II: Refinement

In this compulsory exercise (Oblig II) you will be trained in refinement and the semantics of UML.

The sequence diagrams represent some scenarios in relation to a cyberrange. A cyberrange is a simulation platform used for training IT and cybersecurity professionals, assessing incident response processes, and testing new technologies. However, all exercises can be solved without any background from or domain knowledge about cyberranges.

The solution-paper in the form of a single pdf-document should be sent to kst@sintef.no by midnight October 22. You may work in groups of **maximum three students** or **you may work alone**. Hence, one solution may have up to three names. There should be no collaboration or copying **between different groups**. **Hence, each group should solve the exercise independently.**

Remember to put your real names (not usernames) in the solution-paper so that I can see who wrote it when it is printed on paper.

The sequence diagrams referred to in the questions are attached at the end.

Question I

- a) Which events may occur as the first event in a positive trace of sd RedBlueFight-1? Explain your answer.
- b) What is the minimum length of a positive trace of sd RedBlueFight-1? Explain your answer.
- c) Which events may occur as the last event in a positive trace of sd RedBlueFight-1? Explain your answer.
- d) How many positive traces are there for sd War-2? Explain your answer.
- e) Describe one negative trace of sd RedBlueFight-2. Use the $\langle e_1, e_2, \dots, e_j \rangle$ notation where $e_1, e_2, \dots, e_j$ are events.
- f) Which events may occur as the first event in a negative trace of sd War-2? Explain your answer.

Question II

a) Is sd War-2 a refinement of sd War-1. If so, is it a pure supplementing, a pure narrowing or a combination? Explain your answer.

b) Is sd War-3 a refinement of sd War-1? If so, is it a pure supplementing, a pure narrowing or a combination? Explain your answer.

c) Is sd War-4 a refinement of sd War-1? If so, is it a general refinement or a limited refinement? Explain your answer.

d) Is sd War-4 a refinement of sd War-3? If so, is it a general refinement or a limited refinement? Explain your answer.

d) Is sd RedBlueFight-2 a refinement of sd RedBlueFight-1? If so, is it a pure supplementing, a pure narrowing or a combination? Explain your answer.

e) Is sd RedBlueFight-3 a refinement of sd RedBlueFight-1? If so, is it a pure supplementing, a pure narrowing or a combination? Explain your answer.

Blue Team

Infrastructure

Red Team

b-login

r-login

loop

ref

War-1

xalt

par

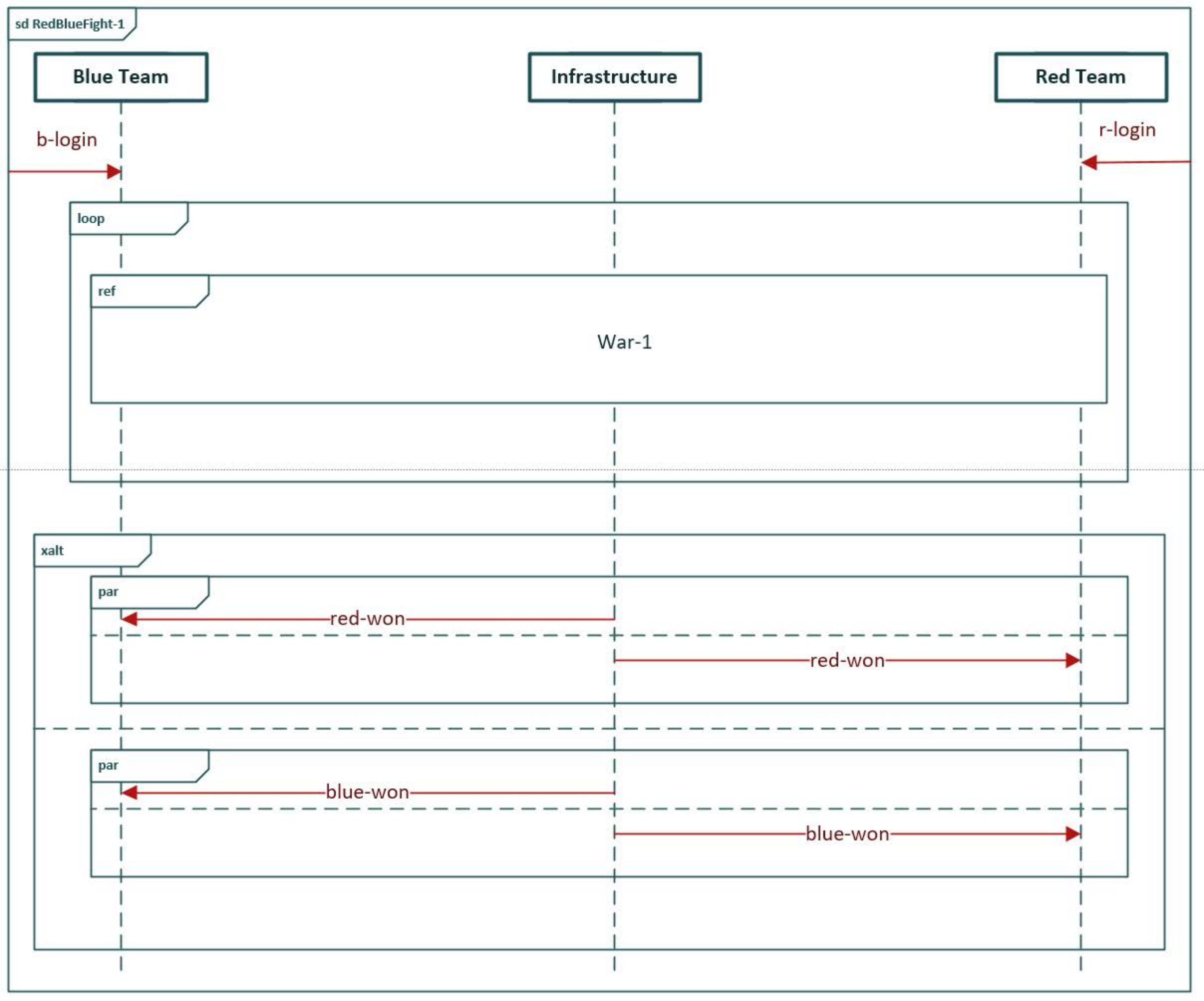
red-won

red-won

par

blue-won

blue-won



Blue Team

Infrastructure

Red Team

b-login

r-login

loop

ref

War-2

xalt

par

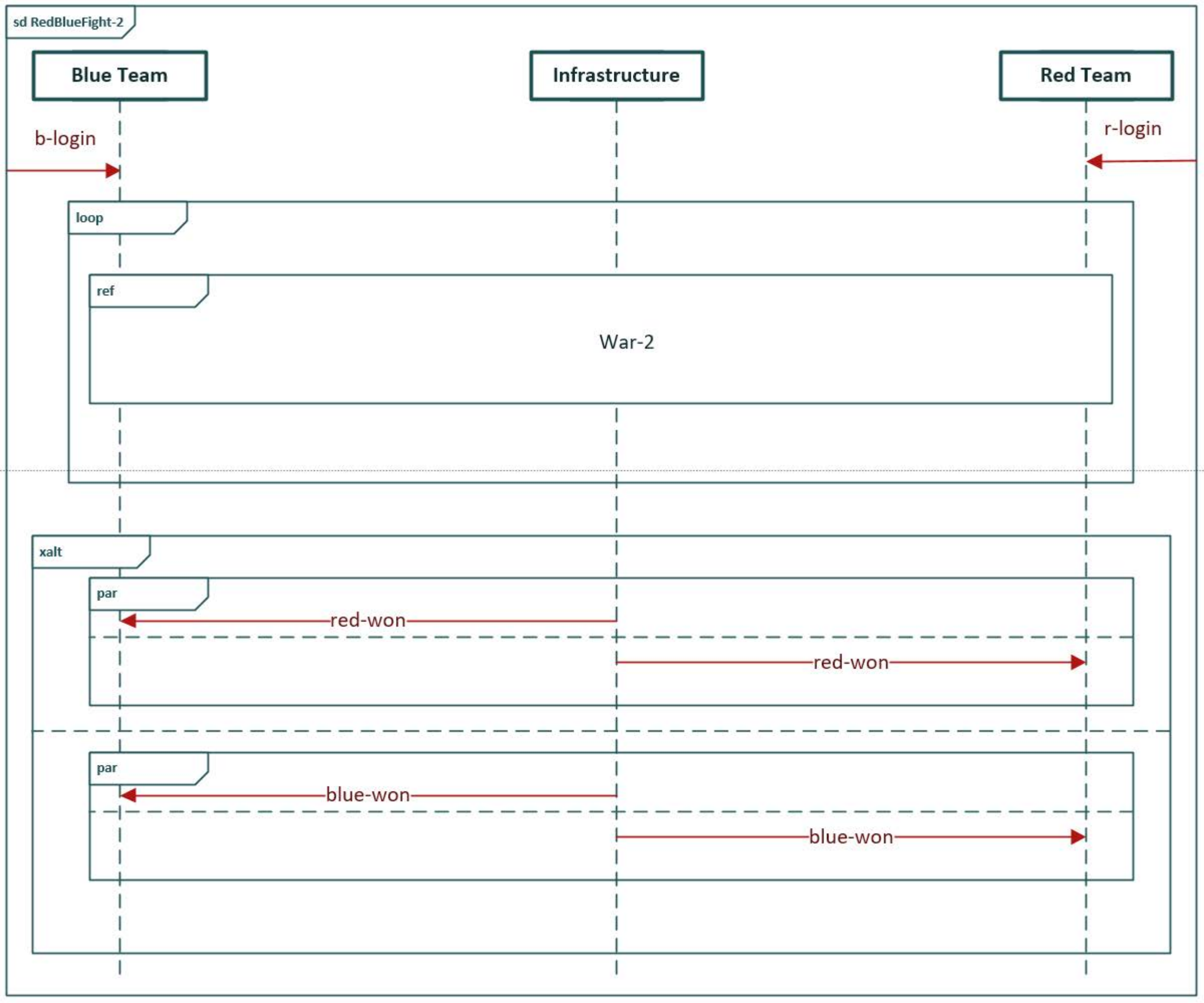
red-won

red-won

par

blue-won

blue-won



Blue Team

Infrastructure

Red Team

b-login

r-login

loop

ref

War-3

xalt

par

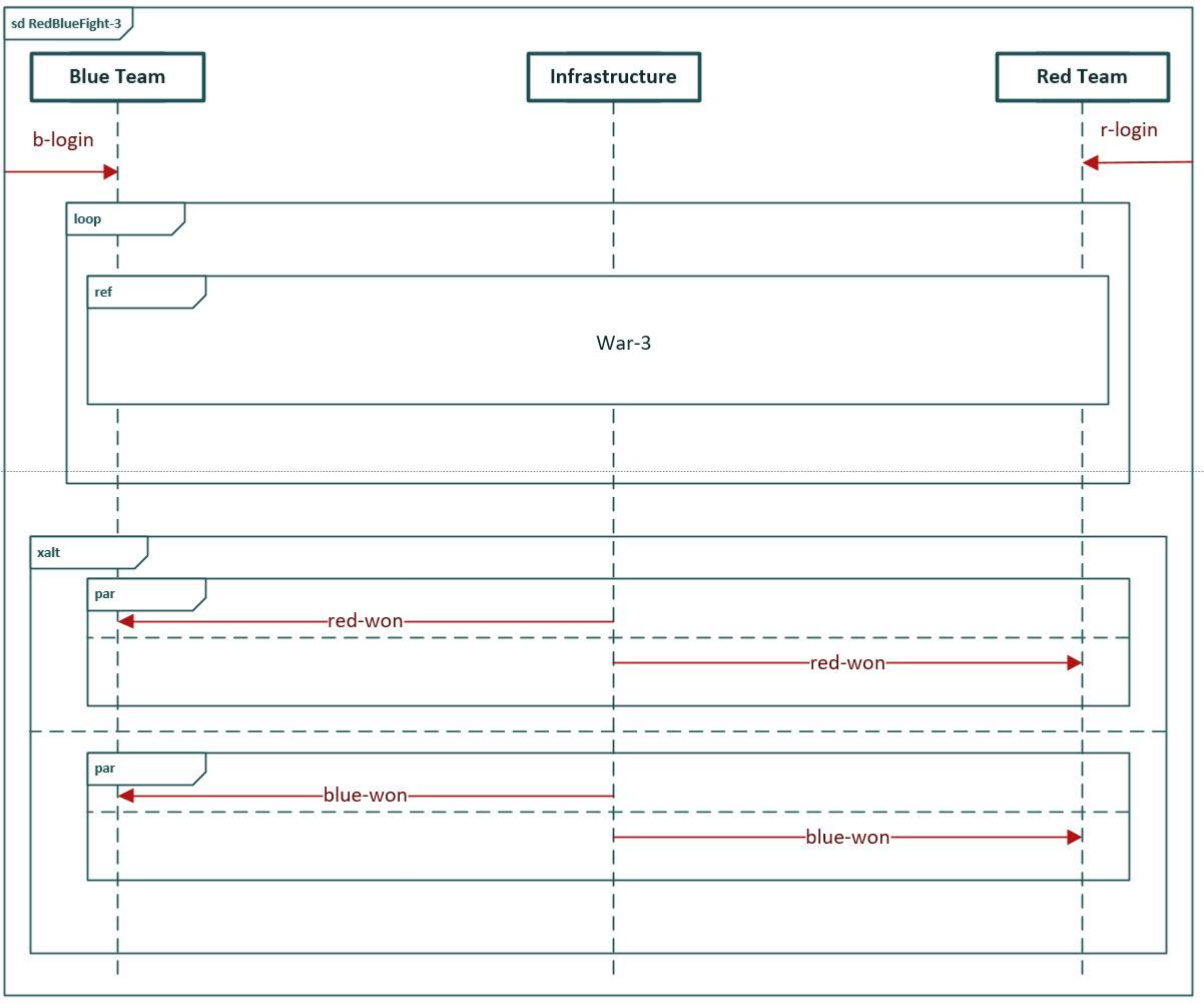
red-won

red-won

par

blue-won

blue-won



Blue Team

Infrastructure

Red Team

alt

attack

a-status

defend

d-status

Blue Team

Infrastructure

Red Team

alt

assert

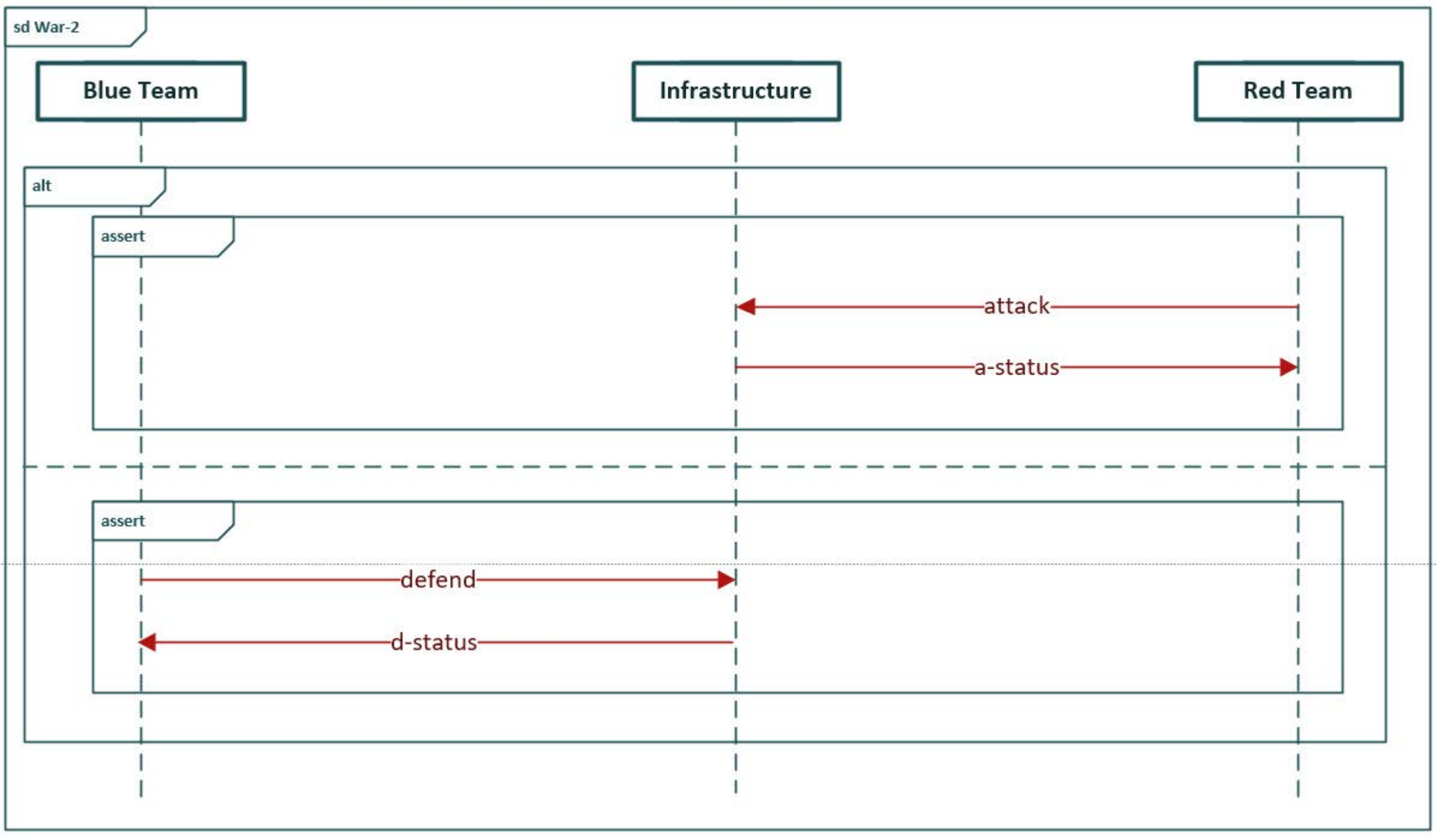
attack

a-status

assert

defend

d-status



Blue Team

Infrastructure

Red Team

par

attack

a-status

defend

d-status

Blue Team

Infrastructure

Red Team

xalt

assert

attack

a-status

assert

defend

d-status

