Scenario

Consider the following scenario, loosely based on real-life medical practice for breast cancer diagnosis (as captured in a proposed process of a committee constituted by the US Department of Health and Human Services).

- A patient, Patricia, goes to a primary care physician, Primo.
- Primo examines the patient and possibly (if the case is suspicious) sends Patricia along to a radiologist, Radia.
- If Radia notices suspicious calcifications, she sends her findings to Primo and recommends a biopsy for Patricia.
- Radia performs a core needle biopsy and sends the collected tissue specimen to a pathologist, Partho, along with her findings.
- Partho analyzes the specimen, and performs ancillary studies. If his findings agree with Radia's findings he sends his report and findings to Primo. Otherwise, he sends his report and Radia's findings to the Tumor Board.
- The Tumor Board is an organizational entity within a hospital that plays a distinct role. Its main function is to adjudicate disagreements between radiologists and pathologists. It informs Primo of its findings regarding Patricia. It also informs Radia and Partho of those findings so they can learn from them.
- Primo discusses the findings he has received with Patricia.

Task

Produce a protocol that reflects the above scenario, taking into consideration the following points:

- A protocol is concerned only with interactions, not with internal decision making.
- A protocol is concerned with roles, not specific agents or people.
- Model the patient's visits as an interaction (i.e., a message).
- Make sure the relevant information flows to the various parties so they can act appropriately.
- Introduce appropriate parameters, including keys.
- Notice that Primo receives findings from one or more of the other parties, and conveys those findings to Patricia. You should verify that your protocol avoids race conditions (see next item).
- A naive formulation of the protocol based on the scenario may fail safety or liveness. Produce a protocol that avoids such problems but succeeds in capturing the essence of the problem scenario.

Deliverables (to be submitted)

1. A protocol constructed by you by hand although taking advantage of syntax verification provided by the tool.
2. An explanation of any safety or liveness problems identified by the tool. We expect two such problems to be explained in about 50-80 words each.
3. A corrected protocol that satisfies all checks.
4. An explanation of how the corrected protocol handles the scenario provided in the problem.

Protocol Tool

Use the following protocol checker tool to verify the syntax and the other properties of your protocol.

You can download the protocheck tool from github; directions for use are in the readme there.

https://github.com/shader/protocheck

Help

Samuel Christie <schrist@ncsu.edu> has kindly offered to help with this assignment.

Please use the message-board forum for this assignment to talk about general concerns and post questions about the tool and so forth. Please do not post any part of your answers publicly; instead, send questions specific to your approach via email. When you write to Samuel, cc Guoqiang and Professor Singh so we can try to help where possible. (As usual, we will try not to provide you solutions but will guide you where we can).