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CSC 750

Project 5

\*\*\* There were times using Node-Red when I am injecting nodes and the 'out parameter' doesn't get outputted so following nodes would not work (sometimes cells and/or calcification wouldn't get outputted). I would restart flow multiple times and it would keep happening. There were also times where I would inject nodes (like report nodes in Patho and Radio flow) and it would output an empty json. Not sure why this happened, but there were times I wouldn't be able to do any enactments because of these problem. You may run into these issues when trying to recreate the enactment I provided below \*\*\*

#### Task 1

- Before Protocol
  - File: protocol\_project5\_before.txt
  - created based on my initial interpretation of the scenario given

#### Task 2

- Protocheck
  - Ran safety and liveness check on protocheck tool. Got back true for safety and false for liveness
- Node Red
  - Scenarios that are safe and live with before protocol
    - Patient visits Physician. Physician has no suspicion and finishes rest of visit with Patient (sends message "diagnosis" which ends the protocol)
    - Patient visits Physician. Physician sends tissue to Pathologist and Patient to Radiologist. Both Pathologist and Radiologist send reports to Physician. Physician discusses diagnosis with Patient.
    - Patient visits Physician. Physician sends tissue to Pathologist and Patient to Radiologist. Pathologist sends cells to Tumor Board. Radiologist sends calcification to Tumor Board. Tumor Board sends findings to Physician, Pathologist, and Radiologist. Physician discusses diagnosis with Patient.
  - Scenarios that are not live with before protocol
    - Radiologist sends report to Physician and Pathologist sends sample to Tumor Board or vice versa
      - Patient visits Physician. Physician sends tissue to Pathologist and Patient to Radiologist. Pathologist sends cells to Tumor Board and Radiologist sends report to Physician (or vice versa). Now we are in a deadlock since Tumor Board can't send findings to Physician since it requires samples from both Pathologist and Radiologist. Physician can't get the findings from the Tumor Board and can't send out the

corresponding diagnosis message. It is missing one report from either Pathologist or Radiologist and can't send that corresponding message. And Physician can't send its no suspicion diagnosis message since it already sent out samples to the Pathologist. The protocol can never finish in this scenario

- Steps to recreate this enactment in Node Red
  - Open flow-before.json in node red
  - Go to Patient flow and inject "visit" node
  - Go to Physician, inject "send biopsy" first and then "send patient" nodes
  - Go to Pathologist flow, inject "send report" node and then go to Radiologist flow, inject "send calcification" node
    - Or go to Pathologist flow, inject "send cells" node and then go to Radiologist flow, inject "send report" node
  - Go to Tumor Board flow. Now you can try injecting the "send findings to Physician" node but it won't work since it hasn't gotten both reports from Pathologist and Radiologist. Now since Tumor Board can't send any messages to Physician, when you go back to Physician flow, injecting the "findings" node won't work. Injecting the "reports" nodes won't work since it requires having two reports to send. And the no suspicion node also won't work

### Task 3

- Corrected Protocol
  - File: protocol\_project5\_after.txt
- Protocheck
  - Ran safety and liveness checks and both returned true
- Node Red
  - Scenarios that are safe and live
    - All previous safe and live scenarios from Task 2 still work
      - Patient visits Physician. Physician has no suspicion and finishes rest of visit with Patient (sends message diagnosis using node "no suspicion" which ends the protocol)
      - Patient visits Physician. Physician sends tissue to Pathologist and Patient to Radiologist. Both Pathologist and Radiologist send reports to Physician. Physician discusses diagnosis with Patient. Tumor Board is not involved (using node "patho and radio send reports")
      - Patient visits Physician. Physician sends tissue to Pathologist and Patient to Radiologist. Pathologist sends cells to Tumor Board. Radiologist sends calcification to Tumor Board. Tumor Board sends findings to Physician, Pathologist, and Radiologist. Physician discusses diagnosis with Patient.

(using node "Tumor Board sends findings from Patho and Radio (patho and radio don't send reports)" )

- Corrected protocol now can handle previous scenario that was not live in Task 2
  - Radiologist sends report to Physician and Pathologist sends sample to Tumor Board or vice versa
    - Patient visits Physician. Physician sends tissue to Pathologist and Patient to Radiologist. Pathologist sends sample to Tumor Board and Radiologist sends report to Physician (or vice versa). Now Tumor Board can deal with this situation. It can now:
      - Send findings to Physician if it only gets cell samples
      - Send findings to Physician if it only gets calcification samples
    - Then it sends findings to both Radiologist and Pathologist
    - Then Physician can discuss diagnosis with patient if:
      - Tumor board sent findings and Radiologist sent report
      - Tumor board sent findings and Pathologist sent report
- These are all scenarios I came up with that satisfy the problem given for the project