ASSIGNMENT TWO ~ CPT230 SP1 2021

Due Date: per Canvas published deadline

Assignment Objectives & Structure

This assignment focuses on the concepts raised in lectures 3-7. The assignment is designed as a learning experience in itself and will require additional research rather than purely an assessment of course content to date.

The assignment consists of these parts, totally 25 marks

1. Develop two sequence diagrams (8 marks)
2. Develop a state diagram (8 marks)
3. Refine the class diagram from Assignment One (1 mark)
4. Develop two activity diagrams (8 marks)

Help and Hints

A forum dedicated to the Assignment is available on the discussion board. Any queries and discussions should be directed there. You are free to share URLs and offer suggestions, but do not paste your answers and do not share any direct answer to questions in the online forum.

You will need to read the sample solutions provided for previous year's assignment. This will give you an idea of research depth, response quality, and detail required.

NOTE: This assignment touches some topics which have potential complexity. You are not expected to return complex, industry level responses within 1-2 months of an introductory course. Be wary of getting caught in low level detail.

Trouble Getting Started

If you find yourself overwhelmed / going around in circles, the following advice may help.

- Review the relevant lecture, tutorial and textbook material.
- Model different drafts and try to complete your work incrementally, your first draw/model cannot be the best answer and you need to go through a few drafts for each diagram.

Common mistakes in this subject include

- ‘analysis paralysis’ – over-analysing the question to the extent you can’t get started
- over detailing the responses – remember UML has 13 different models. Every model shows a different ‘filter’ or view, and does not need to contain every piece of data you have been given.

How to Submit

You should submit your assignment using Canvas's submission system. Email submissions will not be accepted.

What to Submit

Your submission should include a single pdf file only – no other formats will be accepted. Use the web to locate and download a free pdf writer if required, asking your peers for help on the forums if you are having trouble. Do not zip the file. You should submit only one file. If you have used graphic/modelling programs to generate models, copy/paste these completed models into your main document with an appropriate heading.

Hand drawn models will not be acceptable. You must use Lucidchart or Visual Paradigm to make all models. Difficulty combining graphics with a main document is not a valid reason for lateness. Ensure you are capable of combining your files at least a week before the assignment is due, and ask for help on the discussion forums if needed.

Late /Extension policy

Late assignments will attract a penalty of 10% (1.5 marks) per day. After 5 days, the penalty will be 100%. You can submit assignment drafts at any time *before the deadline* - these will overwrite previous submissions.

If unexpected or extenuating circumstances mean that you will not be able to submit on time, you can request an extension before the deadline.Longer extension requests are handled by the RMIT Special Consideration unit. Please get further information from this unit regarding policy and time limitations.

Academic integrity

Please refer to RMIT policy:
https://www.rmit.edu.au/students/student-essentials/assessment-and-results/academic-integrity

On-Vacc

You have been assigned to develop On-Vacc, a new vaccine administration and handling system, that is based on the Commonwealth Government's vaccine rollout strategy. Shakira, George and Corey return with Prendergast from the state health department.

Budget Plus Regional Manager - Shakira Rahman
Thanks for the awesome design models you gave us last week! We've considered a lot more about how the On-Vacc will be used, working with Prendergast from the DHHS.

Department of Health Program Coordinator - Corey Messina
We did not reach our target of *Cominarty* rollouts in Phase 1 of the program. The cost of these special fridges to store the vaccines at -70℃ was too much for many clinics. For Phase 2B, we want to trial an alternative strategy. This time we will make use of existing national vaccine storage guidelines(used currently for flu-shots, measles, etc) .

The *Cominarty* vaccine vials will be delivered in 'pizza' boxes which are in deep-freeze -70℃ temperatures. The vaccine site would have made an online order of X number of vials, based on their week's appointment schedule. When receiving each shipment the pharmacy staff will add them to the On-Vacc vaccine inventory automatically, by scanning the manufacturer (Pfizer) barcodes on each vial before storing them in the vaccine fridge. On-Vacc will send a record of all delivered vials to our own Vaccine Management system.

Budget Plus Senior Software Engineer - George Alwyn
With the support of DHHS, we will get purpose-built standard vaccine fridges with temperature data loggers to all our vaccination sites. Each data logger will send temperature readings at 5 min intervals to On-Vacc. Email and SMS alarms are sent to the Vaccine Manager if three consecutive readings are below or above the recommended vaccine range of -8℃ to -2℃. We have a term for this event - a 'cold chain breach'.

Although Cominarty arrives to us in deep-freeze state, when stored in our vaccine fridges within 15 minutes of delivery, they will last exactly the earlier of either the vial expiry date/time, or 5 days from delivery. This means that on receiving and scanning the manufacturer's barcode on the vials, the Vaccine Manager will print out a label with the new date and time expiry, and affix it to the vial before refrigeration within 15 min.

DHHS Software Architect - Prendergast Cho
Twice daily, according to federal guidelines, the relevant vaccine staff will need to record the minimum and maximum temperatures for the purpose of reporting any cold chain breach to us at DHHS. Each time, they need to record the minimum and maximum temperatures of those 5 min interval readings for the period since the last entry. We have

sent you a PDF version of the existing forms for recording this for normal vaccines. (see appendix 2) but for Budget Plus and Cominarty, we would like On-Vacc to do this electronically. The Vaccine Manager will open up a form to view all previously recorded date and min/max temperatures, and be able accept the pre-filled minimum and the maximum temperatures sent by the data logger since the last reading - and submit.

Budget Plus Senior Software Engineer - George Alwyn
On-Vacc should store the status of vials, starting from the time the Vaccine Manager orders them from the Department of Health. When the vials arrive, their status will change from ORDERED to IN-STORAGE once they are scanned and the new label with the expiry date is printed and affixed to each vial. Sometimes the full number of vials are not received, so the Vaccine Manager records the vial as NOT-DELIVERED. We cannot receive any more vials than ordered, for each delivery. A vial record with the manufacturer's ID is created, marked as SURPLUS and sent back via the same courier.

When the vial is taken out of the fridge, punctured and used for doses, the vial is recorded as DOSED and will remain until they are automatically EXPIRED by the system unless administered or otherwise damaged or unusable. When a vial is dosed, we want to track concurrently the status of the six doses (each starting in DOSED state). We hope each dose will reach the ADMINISTERED state within 6 hours, otherwise they will also reach the EXPIRED state along with the vial. At any time during the life cycle, the predosed vial or the dose can be recorded by the Vaccine Manager as DAMAGED, if the container (syringe or vial) is compromised (such as a crack). If left outside of storage, in room temperature, over two hours, then a vial or dose will be recorded as DAMAGED_TEMP. The cold chain breach of the vaccine fridge will first put all inventory in the REPORTED state. They cannot be administered. If the DHHS communicates (via email or fax) that the vial or dose is not usable, then they are marked as DAMAGED_BREACH and the details of the DHHS confirmation are recorded in a comment field. Otherwise, if the DHHS verdict is an Okay, the Vaccine Manager will return their status to the state that makes sense (DOSED or EXPIRED, etc) .

Budget Plus Regional Manager - Shakira Rahman
Is this meeting on record? Great! Note all vaccine handling is assigned to the Vaccine Manager, except damage reporting which is done by Vaccine administrators too.
We're so glad you are building On-Vacc for us! Here are two user scenarios for you that we prepared earlier… [see Task 1 below]

Your Tasks

1) Develop Sequence Diagrams (2 x 4 marks)

a) Create a sequence diagram for each of the two user scenarios below. You should show how objects will interact to achieve the aims of the user.

b) Your diagram will be assessed on:

- Consistency and completeness with the scenario and the refined class diagram provided in this assignment
- Appropriate identification and use of objects, messages, lifelines, activations, frames (for iteration or selection), etc.

c) The two user scenarios provided by Shakira are:

- Vera the Vaccine Manager puts in her usual order in On-Vacc of three *Cominarty* vials for the forthcoming appointments. The order is set for immediate (asap) delivery as she can't order in advance. On-Vacc updates their status to DELIVERY-PENDING on the same day after the Department of Health has processed the order. When the order arrives, Vera scans each vial. The system stores the manufacturer's vial ID into the system. Vera prints the new expiry labels and affixes them. If the manufacturer's expiry date/time on the vial is sooner than the 5 day expiry, she manually enters the date/time of expiry before printing the label. If she gets more vials than ordered, she creates a new vial record for each surplus, scans them for the ID and marks them as surplus before returning them to the courier. If she gets less than ordered, she will update the vial record as NOT-DELIVERED.
- When a patient arrives for an appointment, Vespa the Vaccine Administrator checks to see if they have pre-submitted the form online. If they haven't, she requests their photo ID and a Medicare card, scans them into On-Vacc and then provides them with an iPad to complete the consent form. If the patient has pre-submitted but don't have the IDs, Vespa will record the appointment record as 'Not Vaccinated' and rebook.

If the patient answers No to any of the health background questions, or they don't confirm the three consent confirmation, they can't submit the form and have to exit the form (which also has a 20 minute timeout).
Vespa will review the saved details of the form and counsel the patient or rebook an appointment depending on the case. If the patient submits successfully, Vespa will review the form and if she has any doubts, she may question the patient. As a result, she may decline to vaccinate and update the patient's appointment record as 'Not Vaccinated' and enter her comments and explanations in the system.
After vaccination, Vespa will record the patient's record as 'Vaccinated', and let them wait 15min onsite. If there are any patient health reactions to the vaccination, she will attend to them, and if the reactions are different to expected responses, she makes an adverse reaction report in On-Vacc.

2) Develop a State Diagram... (8 marks)

a) … to model the states that the system will store of the Vial/Dose based on the Assignments One and Two stakeholder statements, as well the scenarios in Q1.
b) Your diagram will be assessed on:
   - Consistency and completeness with both the stakeholder's statements and your updated class diagram in this assignment.
   - Appropriate use of UML notation

3) Refine the Class Diagram from Assignment One (1 mark)

a) Based on the stakeholder statements, and the modelling in earlier questions, revise the class diagram and highlight any new classes or methods.
b) Your diagram will be assessed on:
   - consistency with your sequence and state diagram
   - appropriate use of UML notation

4) Develop an Activity Diagram (2 x 4 marks)

a) Create activity diagrams based on the two scenarios in Question 1. Your diagram will be assessed on:
   - Consistency and completeness with both the scenario and your class diagram.
   - Your diagram should include all of the following where relevant : Actions, decisions, joins, forks, merges, and swimlanes.

Appendix One: Pfizer vaccine / vials and packaging

This is generally for background only.

Read the full provider guide: Interim COVID-19 Vaccine Provider Guide (www.health.state.mn.us/diseases/coronavirus/vaccine/guide.pdf).

Summary of Pfizer vaccine

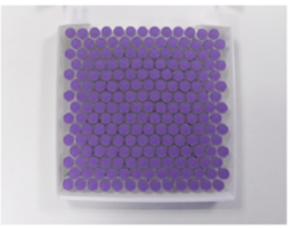
Age indication	Dose/route	Schedule	Presentation/preparation	Storage and handling	Notes
16 years and older	0.3 mL IM	0, 21 days	Multi-dose: 6 doses per vial* Reconstitute with diluent; diluent ships separately from vaccine. No preservative.	**Ultra-cold freezer** (-80°C to -60°C/-112°F to -76°F): until expiration date. **Thermal shipper:** (-90°C to -60°C /-130°F to -76°F): up to 30 days from delivery, if replenished with dry ice upon receipt and every five days. **Freezer:** (-25°C to -15°C/ -13°F to 5°F): up to two weeks. **Refrigerator****(2°C to 8°C/36°F to 46°F): up to 120 hours (five days). If not used, discard. **Room temperature****: Thawed vials must be reconstituted within two hours.	Not interchangeable with other COVID-19 vaccines. Use vaccine within six hours once vial is punctured. Cannot place thawed vaccine back in freezer.

*The Pfizer-BioNTech COVID-19 vaccine multi-dose contains six 0.3 milliliter (mL) doses. See the vaccine preparation section for more information.

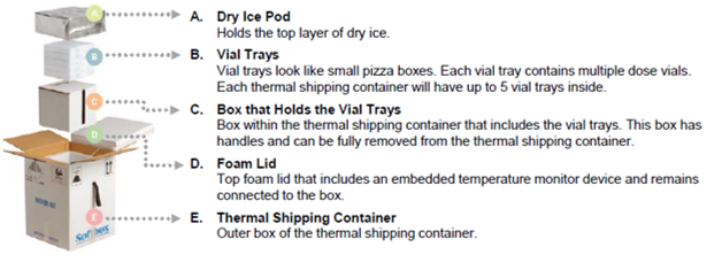
**Once reconstituted, must use within six hours (discard unused vaccine).

Vials

Trays



Thermal Shipper

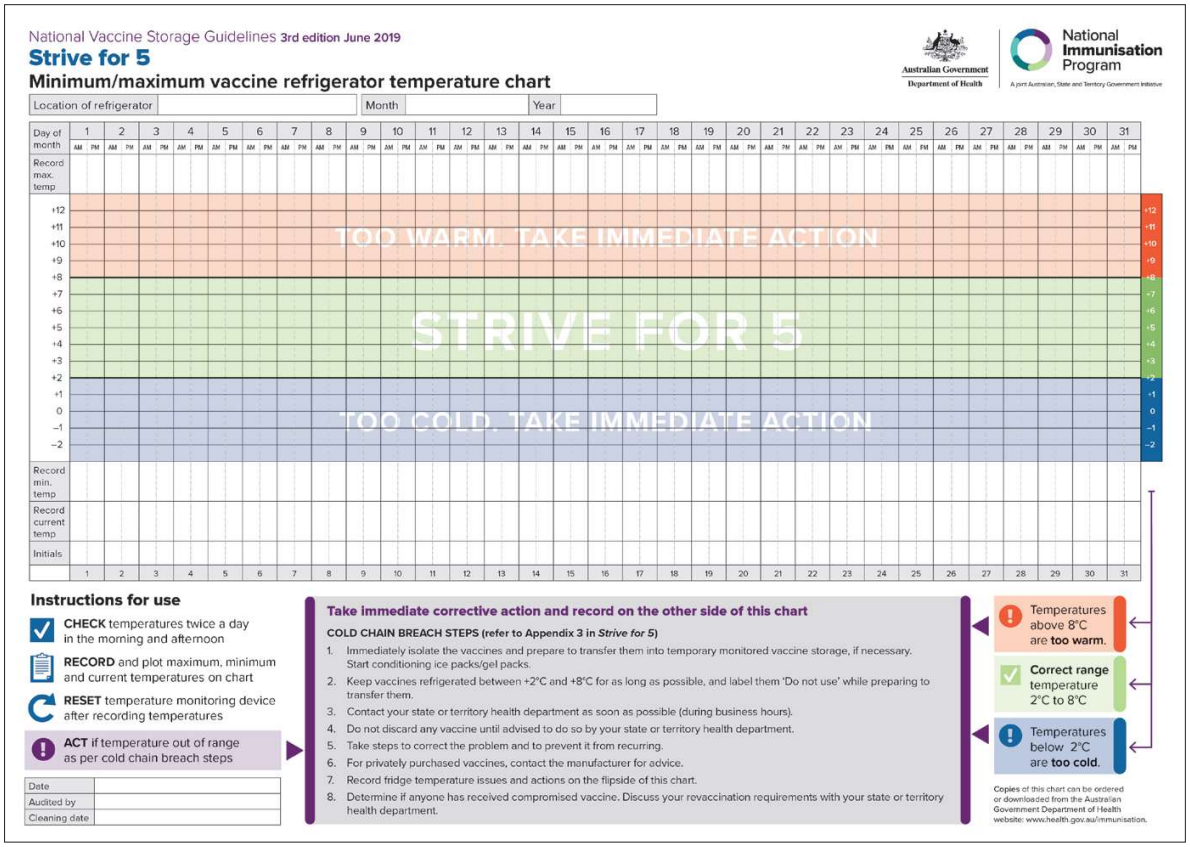


Appendix Two: Minimum/maximum refrigerator temperature chart

APPENDIX 5:

Minimum/maximum vaccine refrigerator temperature chart

Copies of this chart can be ordered or downloaded from the Australian Government Department of Health website: www.health.gov.au/immunisation.



National Vaccine Storage Guidelines 3rd edition June 2019

Strive for 5

Minimum/maximum vaccine refrigerator temperature chart

Australian Government Department of Health

National Immunisation Program

A joint Australian, State and Territory Government initiative

Location of refrigerator | Month | Year

Day of month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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+6																															
+5																															
+4																															
+3																															
+2																															
+1																															
0																															
−1																															
−2																															
Record min. temp																															
Record current temp																															
Initials																															

TOO WARM. TAKE IMMEDIATE ACTION

STRIVE FOR 5

TOO COLD. TAKE IMMEDIATE ACTION

Instructions for use

- **CHECK** temperatures twice a day in the morning and afternoon
- **RECORD** and plot maximum, minimum and current temperatures on chart
- **RESET** temperature monitoring device after recording temperatures
- **ACT** if temperature out of range as per cold chain breach steps

Date	
Audited by	
Cleaning date	

Take immediate corrective action and record on the other side of this chart

COLD CHAIN BREACH STEPS (refer to Appendix 3 in *Strive for 5*)

1. Immediately isolate the vaccines and prepare to transfer them into temporary monitored vaccine storage, if necessary. Start conditioning ice packs/gel packs.
2. Keep vaccines refrigerated between +2°C and +8°C for as long as possible, and label them 'Do not use' while preparing to transfer them.
3. Contact your state or territory health department as soon as possible (during business hours).
4. Do not discard any vaccine until advised to do so by your state or territory health department.
5. Take steps to correct the problem and to prevent it from recurring.
6. For privately purchased vaccines, contact the manufacturer for advice.
7. Record fridge temperature issues and actions on the flipside of this chart.
8. Determine if anyone has received compromised vaccine. Discuss your revaccination requirements with your state or territory health department.

Temperatures above 8°C are **too warm.**

Correct range temperature 2°C to 8°C

Temperatures below 2°C are **too cold.**

Copies of this chart can be ordered or downloaded from the Australian Government Department of Health website: www.health.gov.au/immunisation.