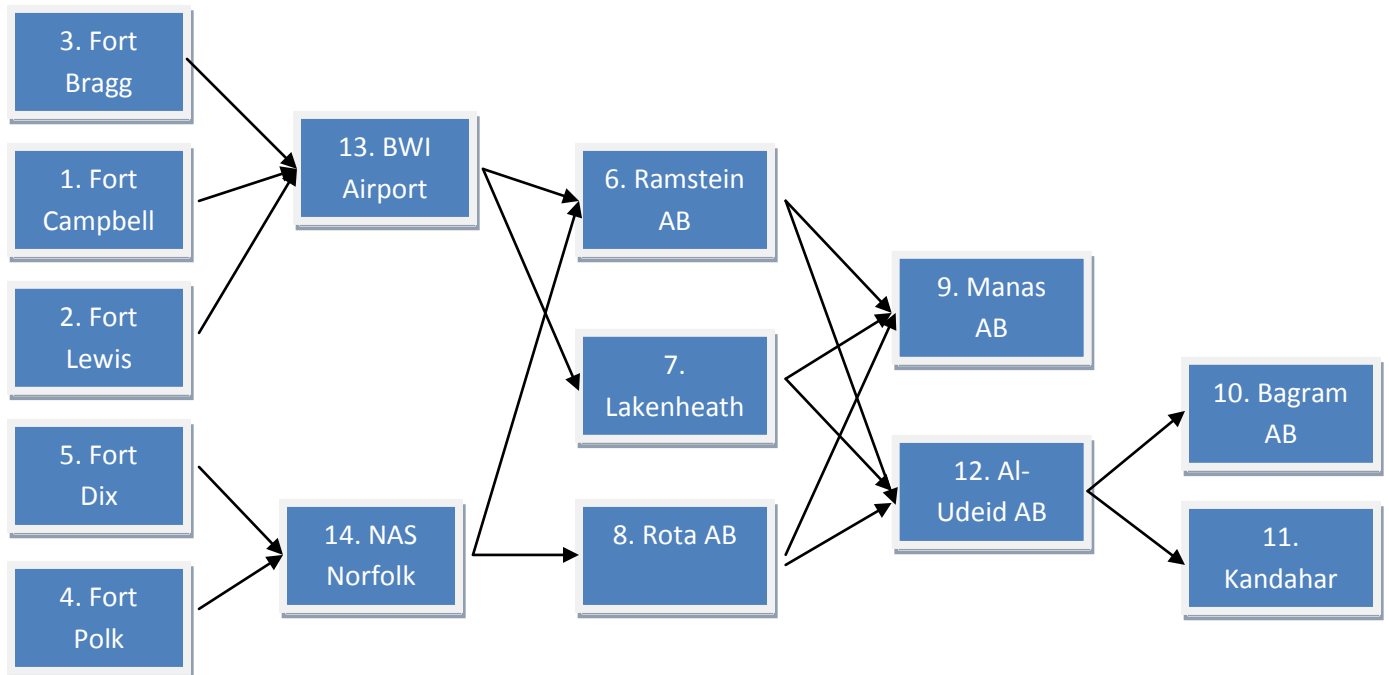


DEPLOYMENT SIMULATION PROJECT

Due Date: 28 February

Background:

Platoons are deploying to the Middle East at a pace of 10 platoons/day. The USAF's Air Mobility Command is tasked with expediently moving these platoons from their home bases to their deployment locations. The following 17 routes are currently flown by the Air Mobility Command:



Platoons deploy from and to the locations listed below with the given frequency:

		9	10	11	12
	To:	Manas	Bagram	Kandahar	Al-Udeid
1	Campbell	2%	6%	5%	1%
2	Lewis	3%	4%	5%	2%
3	Bragg	5%	9%	8%	1%
4	Polk	6%	7%	8%	2%
5	Dix	4%	4%	7%	2%
6	Ramstein	1%	1%	0%	2%
7	Lakenheath	1%	0%	0%	2%
8	Rota	0%	1%	0%	1%

The AMC inventory is 20 planes: 8 C-5s which can carry three platoons, 7 Rotators which can carry four platoons and 5 C-130s which can carry two platoons. Currently, the AMC is only using 17 planes (one for each route flown), and have 2 additional rotators and 1 additional C-5 that are idle. The types of planes used currently for each route is given below along with the flight times between the bases:

Current Flight Roster				Flight Times (in hours)			
	13	14			13	14	
	to: BWI	Norfolk			to: BWI	Norfolk	
1 Campbell	C-130			1 Campbell	10	10	
2 Lewis	C-130			2 Lewis	14	14	
3 Bragg	C-130			3 Bragg	9	9	
4 Polk		C-5		4 Polk	11	11	
5 Dix		C-5		5 Dix	9	10	
	6	7	8		6	7	8
	to: Ramstein	Lakenheath	Rota		to: Ramstein	Lakenheath	Rota
13 BWI	Rotator	Rotator		13 BWI	17	16	17
14 Norfolk	Rotator		Rotator	14 Norfolk	17	17	17
	12	9			12	9	
	to: Al-Udeid	Manas			to: Al-Udeid	Manas	
6 Ramstein	Rotator	C-5		6 Ramstein	15	15	
7 Lakenheath	C-5	C-5		7 Lakenheath	16	16	
8 Rota	C-5	C-5		8 Rota	16	18	
	9	10	11		9	10	11
	to: Manas	Bagram	Kandahar		to: Manas	Bagram	Kandahar
12 Al-Udeid		C-130	C-130	12 Al-Udeid	12	11	11

An ARENA model of the current set up (Project Model Baseline) is attached. The model simulates 1000 platoons getting deployed over the course of about 100 days. The average “Total Time” it takes from the time the platoon is ready to deploy until they report to their deployment location is 109 hours. TRANSCOM and AMC view this to be unacceptably high and have come to the ORSA team for improvement options.

Part I:

In this model, what are entities? What are their attributes? What are the events? What constitutes the system state? What are the activities?

Part II:

Currently, there are 17 routes being flown by 17 A/C, leaving 2 Rotators and 1 C-5 left over. Where should those planes be used in order to cut the average deployment time down the most? (They must be used on routes which currently are flown by that A/C.)

Part III:

Currently, platoons traveling through BWI headed to Manas travel through Ramstein and those traveling through BWI going to Al-Udeid, Bagram and Kandahar travel through Lakenheath. Platoons traveling through Norfolk on the way to Manas go through Rota, all others go through Ramstein.

Going back to the original model, platoons traveling from BWI could go to either Ramstein or Lakenheath on their way to their final destination. Similarly, platoons moving through Norfolk could travel through either Ramstein or Rota. By changing just these two decision blocks, find the policy which speeds up overall deployment time.

Part IV:

The AMC commander has given you the flexibility to suggest changes to the current system in any way you see fit. The #1 goal of these changes is to minimize the average “Total Time” it takes these platoons to deploy. However, there are a few guidelines you have to adhere to.

Rules for changing flights:

- All flights going across the Atlantic must originate out of either BWI or Norfolk
- All flights from BWI or Norfolk must stop in Europe (Ramstein, Lakenheath, Rota)
- No intra-theater flights except for those emanating from Al-Udeid (e.g. no Manas-Bagram flights allowed)
- No flights are allowed from Europe to Bagram or Kandahar
- All planes must be full before taking off
- All planes flying a particular route must be identical (e.g. can't fly a C-5 and a C-130 from Bragg to BWI)
- There must be a route for each deploying platoon to get to its destination
- At least one flight must travel to each of Norfolk and BWI

What you can change:

- Which types of planes fly which routes
- How many planes fly each route (e.g. Ramstein to Al-Udeid could be serviced by two planes instead of one)
- Which routes could be canceled

- Decision policy for deploying platoons

 - For example, Bragg deployers going to Bagram must fly Bragg-BWI-Lakenheath-Al-Udeid-Bagram rather than Bragg-BWI-Rota-Al-Udeid-Bagram

 - Or, travelers from BWI go to either Rota or Ramstein depending on which is less busy

How to make changes:

- Which types of planes fly which routes

 - Double click on the "Batch" block corresponding to the flight route you would like to change

 - Change the Batch Size to the number of platoons the plane can carry (2, 3, or 4)

- How many planes fly each route (e.g. Ramstein to Al-Udeid could be serviced by two planes instead of one)

 - On the left side of the screen, click on Resource

 - At the bottom of the screen find the Plane which corresponds to the route you would like to change

 - Under capacity, change the number to the total number of planes you wish to fly that route


- Which routes could be canceled

 - Delete the three blocks corresponding the flight to be cancelled (the "Batch" block, the "Flight" block, and the "Separate" block)

 - Connect the nodes that fed that route to other nodes

- Which routes will be created

 - Copy the three blocks for an existing flight, and paste them in the location desired

 - Using the  symbol, connect the flight to the appropriate blocks

 - Rename the blocks using the same nomenclature

 - Double-click on the "Flight" block to edit

 - Under resources, click "Edit..."

 - Change the Plane name to reflect the proposed route, leave the Quantity at 1, click "OK", click "OK"

- Decision policy for deploying platoons

- Double-click on the “Decision” block where you want to make a change
- If you want to add additional possibilities for the decision block (i.e. change it from a two-way decision to a three-way decision), under “Type:” click on “N-way by Condition”
- If you want to change the logic behind where the platoon goes, the best way is to right-click in the “Value:” area and click “Build Expression”

Deliverable – Powerpoint Presentation (50 points)

Project will be done by groups of three.

Slide 1 – Title Slide

Slide 2 – Background

Slide 3 – Answers for Part I

Slide 4 – Methodology for Part II

Slide 5 – Answers for Part II

Slide 6 – Numerical results for Part II

Slide 7 – Methodology for Part III

Slide 8 – Answers for Part III

Slide 9 – Numerical results for Part III

Slide 10 – Methodology for Part IV

Slide 11 – Answers for Part IV

Slide 12 – Numerical results for Part IV

Slide 13 – Conclusion

Grading

Grading (in part) will be based on the quality of your results.

Part I – 5 points

Part II – 10 points

Part III – 15 points

Part IV – 20 points – a two-point bonus will be given if your results beat the current best of an average “Total Time” of 79.6 hours.