Assignment. The 7th National Bank has two check-processing sites. Site 1 can process 10,000 checks per day, and site 2 can process 6000 checks per day. The bank processes three types of checks: vendor, salary, and personal. The processing cost per check depends on the site, as listed in below. Each day, 5000 checks of each type must be processed. Develop a network model to determine how to minimize the daily cost of processing checks.

Bank data			
Processing costs per check			
	Vendor	Salary	Personal
Site 1	$0.05	$0.04	$0.02
Site 2	$0.03	$0.04	$0.05

Discussion.

This is an example of an assignment problem where checks in a bank are assigned to 2 different sites based on the processing capacity and the processing cost of each of the sites. The decision is hence how many checks of each type must be assigned to each site. The constraints must ensure the total number of checks assigned to a site does not exceed its daily processing capacity and the demand for each type of checks process over both the sites meet the demand for that type of check. The objective is again straightforward and is to minimize the daily processing cost.

Model.

Parameters:

R_i : *Required checks of type* i, *where* $i \in (vendor, salary, personal)$

P_j : *Processing capacity of site* j , *where* $j \in (1,2)$

C_{ij} : *Cost of processing check type* i *in site* j, *where* $i \in (vendor, salary, personal), j \in (1,2)$

Decisions:

x_{ij} : *Number of checks of type* i *that must be processed in site* j, *where* $i \in (vendor, salary, personal), , j \in (1,2)$

Objective: *Minimize Cost*

$min \sum_{i,j} x_{ij} * C_{ij}$

Constraints:

$\sum_i x_{ij} \leq P_j$ (1) Processing capacity of each site j

$\sum_j x_{ij} \geq R_i$ (2) Requirement for each check type i

$x_{ij} \geq 0$ (3) Non- negative number of checks allocated to sites

Notes:

Optimal Solution. The following is the solution obtained from Excel Solver.

A minimum cost of 450$ can be attained by allocating each of the checks to each of the sites as shown below.

Number of check of each type in each site			
	Vendor	Salary	Personal
Site 1	0	5000	5000
Site 2	5000	0	0
	5000	5000	5000

Bank data						
Processing costs per check						
	Vendor	Salary	Personal			
Site 1	$0.05	$0.04	$0.02			
Site 2	$0.03	$0.04	$0.05			
Number of check of each type in each site						
	Vendor	Salary	Personal		Capacity of each site	
Site 1	0	5000	5000	10000	10000	
Site 2	5000	0	0	5000	6000	
	5000	5000	5000			
Requiremt of each type	5000	5000	5000			
Objective	450					