Eon Ross

**Question 10-5** Premier Consultant’s two consultants, Avery and Baker, can be scheduled to work for clients up to a maximum of 160 hours each over the next four weeks. A third consultant, Campbell, has some administrative assignments already planned and is available for clients up to a maximum of 140 hours over the next four weeks. The company has four clients with projects in progress. The estimated hourly requirements for each of the clients over the four-week period are:

**Client Hours**
A  180  
B  75  
C  100  
D  85  

Hourly rates vary for the consultant-client combination and are based on several factors, including project type and the consultant’s experience. The rates (dollars per hour) for each consultant-client combination are:

<table>
<thead>
<tr>
<th>Client</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avery</td>
<td>100</td>
<td>125</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>Baker</td>
<td>120</td>
<td>135</td>
<td>115</td>
<td>120</td>
</tr>
<tr>
<td>Campbell</td>
<td>155</td>
<td>150</td>
<td>140</td>
<td>130</td>
</tr>
</tbody>
</table>

A. Develop a network representation of the problem.
B. Formulate the problem as a linear program, with the optimal solution providing the hours each consultant should be schedule for each client to maximize the consulting firm’s billings. What is the schedule and what is the total billing?

**Lingo Programming code**

```lingo
!Objective Function;
MAX = (100 *H11) + (125 *H12) + (115 *H13) + (100 *H14) + (120 *H21) + (135 *H22) + (115 *H23)
+ (120 *H24) + (155 *H31) + (150 *H22) + (140 *H23) + (130 *H24);

!H11-H14 are Avery's Client variable A thru D;
!H21-H24 are Baker's Client variable A thru D;
!H31-H34 are Campbell's Client variable A thru D;
!Objective Function defines H11-H34;

!Constraints;

H11 + H12 + H13 + H14 <= 160; !Avery total possible hours worked A thru D;
H21 + H22 + H23 + H24 <= 160; !Bakers total possible hours worked A thru D;
H31 + H32 + H33 + H34 <= 140; !Campbell total possible hours worked A thru D;

H11 + H21 + H31 <= 180; !Client A total hours needed;
H12 + H22 + H32 <= 75; !Client B total hours needed;
H13 + H23 + H33 <= 100; !Client C total hours needed;
H14 + H24 + H34 <= 85; !Client D total hours needed;

H11 >=0; H13 >=0; H14 >=0; H21 >=0; H22 >=0; H23 >=0; H24 >=0; H31 >=0; H32 >=0; H33 >=0; H34 >=0;
```

**Consulting Schedule**

<table>
<thead>
<tr>
<th>Consultant</th>
<th>Client A</th>
<th>Client B</th>
<th>Client C</th>
<th>Client D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avery</td>
<td>40hrs</td>
<td>—</td>
<td>100hrs</td>
<td>—</td>
</tr>
<tr>
<td>Baker</td>
<td>—</td>
<td>75hrs</td>
<td>—</td>
<td>85hrs</td>
</tr>
<tr>
<td>Campbell</td>
<td>140hrs</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
Total Billings

Avery: 40hr @ $100/hr Client A
       100hr @ $115/hr Client C
Total Avery billings 4000 + 11500 = 15500

Baker: 75hr @ $135/hr Client B
       85hr @ $120/hr Client D
Total Baker billings 10125 + 10200 = 20325

Campbell: 140hr @ $155/hr Client A
Total Campbell billings = 21700

Total consulting billings 57525
C. New information shows that Avery doesn’t have the experience to be scheduled for client B. If this consulting assignment is not permitted, what impact does it have on total billings? What is the revised schedule?

**Answer:** Since Avery was not scheduled to work for client B, the fact that he is now not allowed to work for client B has no bearing on the total billings needed to maximize profit.