Week 5
Examples and Analysis of Algorithms

Assist. Prof. Dr. Caner ÖZCAN
Example: Algorithm of Brewing Tea

1. Start
2. Add water to the teapot
3. Put teapot to the cooker and fire it
4. Does the water boil?
   - Yes: Brew tea and add water to the teapot
   - No: Wait
5. Does tea brew and water boil?
   - Yes: Service
   - No: Wait
6. End
Example: Passing Across Algorithm

1. Start
2. Look at the left side of the road
3. Is car coming?
   - Yes: Wait
   - No: Walk to refuge
4. Look at the right side of the road
5. Is car coming?
   - Yes: Wait
   - No: Walk across
6. End
Example: Traffic Algorithm

Start

Look at the traffic lights and read lights

Is it the green light?

Yes

Is it the yellow light?

Yes

Slow

No

Stop

No

Wait

Yes

Go on

Geç

Yes

End

No

Look at the traffic lights and read lights

Is it the green light?

Yes

No
Example: Multiplication of Two Number

**Algorithm**

Step 1-Start

Step 2-Read A

Step 3-Read B

Step 4-Calculate C=A*B

Step 5-Write C

Step 6-Stop

**Flow Chart**
Example: Square and Cube of Sum of Two Number

Algorithm

Step 1-Start

Step 2-Read BIRSA and IKISA

Step 3-TO=BIRSA+IKISA

TOKA=TO^2

TO3=TO^3

Step 4-Write TOKA, TO3

Step 5-Stop
Example: Determine given number is odd or even

Algorithm

Step 1: Start

Step 2: Enter one number(x)

Step 3: If x mod 2 = 0 then write ‘even’
   else write ‘odd’.

Step 4: End
Example: Print out greater number which are entered.

**Algorithm**

Step 1: Start  
Step 2: Enter first number. (x)  
Step 3: Enter second number. (y)  
Step 4: If x > y then write 1. number is greater.  
Step 5: If y > x then write 2. number is greater.  
Step 6: Else write numbers are equal.  
Step 7: End
Example: Find and print the average grades of 3 students they received an exam

Algorithm

Step 1- Start
Step 2- INOT=0
Step 3- ISAYI=0
Step 4- Read ONOT
Step 5- INOT=INOT+ONOT
Step 6- ISAYI=ISAYI+1
Step 7- If ISAYI<3 then go
  Step 4
Step 8- NORT=INOT/3
Step 9- Write NORT
Step 10- Stop
Example: According to entered midterm and final grade, finding that students passed through the course.

Algorithm

1. Start
2. Write ("Enter visa grade")
3. Read vize
4. Write ("Enter final grade")
5. Read final
6. ortalama = vize * 0.40 + final * 0.60
7. IF ortalama >= 60 THEN
8. Write "Student Passed"
9. ELSE
10. Write "Student Failed"
11. End
Example: Print only odd numbers from 1 to 25

Algorithm

1. Start
2. Sayac=1
3. Toplam=0
4. IF Sayac Mod2 != 0 THEN
5. WRITE Sayac
6. Sayac=Sayac+1
7. IF Sayac<26 THEN GO Step 4
8. End
Example: Find the average of n numbers entered from the keyboard.

Algorithm
1. Start
2. T = 0
3. Read N
4. I = 1
5. If I <= N Then Go Step 6
   Else Go Step 10
6. Read Sayi
7. T = T + Sayi
8. I = I + 1
9. Go Step 5
10. Ort = T / N
11. Write Ort
12. Stop
Analysis Example
**Analysis Example**

![Flowchart and Table]

**Tablo 3.4: Örnek-3.2’nin çalışma prensibi**

<table>
<thead>
<tr>
<th>I</th>
<th>J</th>
<th>Eski T</th>
<th>Yeni T</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0+1+1=2</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2+1+2=5</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>5</td>
<td>5+1+3=9</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>9</td>
<td>9+2+1=12</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>12</td>
<td>12+2+2=16</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>16</td>
<td>16+2+3=21</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>21</td>
<td>21+3+1=25</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>25</td>
<td>25+3+2=30</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>30</td>
<td>30+3+3=36</td>
</tr>
</tbody>
</table>
Başla

T=0

I=1,2,1

T

I=1,2,1

J=1,3,1

T=T+I*J

Dur
Analysis Example

Tablo 3.6: Örnek-3.4’teki akış diyagramının çalışma prensibi

<table>
<thead>
<tr>
<th>I</th>
<th>J</th>
<th>Eski T</th>
<th>Yeni T</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>5</td>
<td>5 + 1*1 = 6</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>6</td>
<td>6 + 1*2 = 8</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>8</td>
<td>8 + 1*3 = 11</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>5</td>
<td>5 + 2*1 = 7</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>7</td>
<td>7 + 2*2 = 11</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>11</td>
<td>11 + 2*3 = 17</td>
</tr>
</tbody>
</table>
Analysis Example
Analysis Example

**Diagram Description:**
- **Start**
- **T1 = 1, T2 = 2**
- **i = 1, 5, 3**
- **j = 3, 0, -3**
- **T1, T2**
- **End**

**Flowchart Components:**
- **T2 = T2 + T1 + i + j**
- **T1 = T1 + i + j**

**Table 3.10: Örnek-3.11'in Çalıştırma Adımlarının Sonuçları**

<table>
<thead>
<tr>
<th>i</th>
<th>j</th>
<th>Eski T1</th>
<th>Yeni T1</th>
<th>Eski T2</th>
<th>Yeni T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1 + 1 + 3 = 5</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td>5 + 1 + 0 = 6</td>
<td>2</td>
<td>2 + 6 + 1 - 3 ÷ 6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>6</td>
<td>6 + 4 + 3 = 13</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>0</td>
<td>13</td>
<td>13 + 4 + 0 = 17</td>
<td>6</td>
<td>6 + 17 + 4 - 3 = 24</td>
<td></td>
</tr>
</tbody>
</table>
Analysis Example
Analysis Example

1. Start
2. T1 = 1, T2 = 2
3. i = 1, 4, 2
4. 2 * T1, T2
5. Dur
6. T1 = i
7. j = 1, 5, 1
8. (j mod 2) <> 0
9. H
10. T1 = T1 + 2 * j
11. T2 = T2 + i + j
12. T2 = T1 + T2 - i

Table:

<table>
<thead>
<tr>
<th>i</th>
<th>j</th>
<th>Eski T1</th>
<th>Yeni T1</th>
<th>Eski T2</th>
<th>Yeni T2</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
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</tr>
<tr>
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<td>3</td>
<td>3</td>
<td>9</td>
<td>5</td>
<td>10</td>
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<tr>
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<td>4</td>
<td>9</td>
<td>19</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>9</td>
<td>19</td>
<td>10</td>
<td>28</td>
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<td></td>
<td></td>
<td>28</td>
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</tr>
<tr>
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<td>3</td>
<td>5</td>
<td>11</td>
<td>33</td>
<td>40</td>
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<tr>
<td>5</td>
<td>5</td>
<td>11</td>
<td>21</td>
<td>40</td>
<td>58</td>
</tr>
</tbody>
</table>

Ekran çıktısı: 42 58
References


► Paul J. Deitel, “C How to Program”, Harvey Deitel.

► Bayram AKGÜL, C Programlama Ders notları