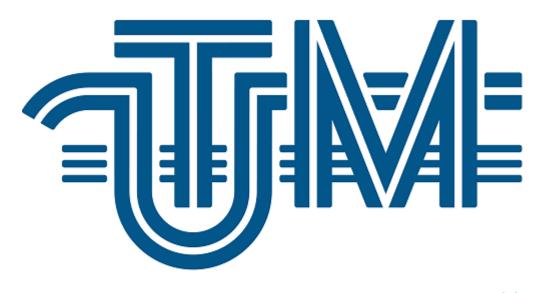
APA laboratory_01

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ATEX

Subject: Algorithm analyzing

Purpose:

- Analiza empirică a algoritmilor.
- Analiza teoretică a algoritmilor.
- Determinarea complexității temporale și asimptotice a algoritmilor

Conditions:

- 1. Efectuați analiza empirică a algoritmilor propuși.
- 2. Determinați relația ce determină complexitatea temporală pentru acești algoritmi.
- 3. Determinați complexitatea asimptotică a algoritmilor.
- 4. Faceți o concluzie asupra lucrării efectuate.

1 Recursive method

Algorithm 1: Recursive method

```
function fib1(n)
if n < 2 then
     return fib1 (n - 1) + fib1 (n - 2)
```

$$T(n)$$
 - f

For line 2 and 3: O(1) For line 5:
$$T(n-1)+T(n-2)$$
 So:
$$T(n)=2, n<2$$

$$T(n)=T(n-1)+T(n-2)+3\approx T(n-1)+T(n-2), n\geq 2$$

$$t_n-t_{n-1}-t_{n-2}=0$$

$$x^2-x-1=0$$

$$\begin{bmatrix} x_1=\frac{1-\sqrt{5}}{2}\\ x_2=\frac{1+\sqrt{5}}{2} \end{bmatrix}$$

$$t_n=C_1(\frac{1-\sqrt{5}}{2})^n+C_2(\frac{1+\sqrt{5}}{2})^n$$

The fraction: $\frac{1+\sqrt{5}}{2}$ is also known as the *Golden Ratio* denoted as φ . The most significant part of t_n is φ .

$$T(n) = O(\varphi^n)$$

2 Iterative method

 ${\bf 3}\quad {\bf Optimized\ iterative\ method}$