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## THEORETICAL ANALYSIS

* Step 1: Input Size

The input for each analysis is an array length of n.

* Step 2: Basic Operation for (1)

### Basic operation is the comparison marked as (1)

#### Analyze B(n)

* Step 3: Count

(1) is executed exactly n times regardless of the input.

* Step 4: Closed-Form

* Step 5: Asymptotic Notation

#### Analyze W(n)

* Step 3: Count

(1) is executed exactly n times regardless of the input.

* Step 4: Closed-Form
* Step 5: Asymptotic Notation

#### Analyze A(n)

* Step 3: Count

(1) is executed exactly n times regardless of the input.

* Step 4: Closed-Form
* Step 5: Asymptotic Notation
* Step 2: Basic Operation for (2)

### Basic operations are the three assignments marked as (2)

#### Analyze B(n)

* Step 3: Count

#### Analyze W(n)

* Step 3: Count

#### Analyze A(n)

* Step 3: Count
* Step 2: Basic Operation for (3)

### Basic operation is two assignments marked as (3)

#### Analyze B(n)

When the input array is full of 0’s, assignments marked as (3) are never executed:

#### Analyze W(n)

When the input array is full of 2’s:

#### Analyze A(n)

* Step 2: Basic Operation for (4)

### Basic operations are the two loop incrementations marked as (4)

#### Analyze B(n)

#### Analyze W(n)

#### Analyze A(n)

* Step 2: Basic Operation for (5)

### Basic operation is the assignment marked as (5)

#### Analyze B(n)

* Step 3: Count

When the input array does not contain any 0, (5) is never executed.

* Step 4: Closed-Form
* Step 5: Asymptotic Notation

#### Analyze W(n)

* Step 3: Count

When the input array is full of 0’s:

* Step 4: Closed-Form
* Step 5: Asymptotic Notation

#### Analyze A(n)

* Step 3: Count
* Step 4: Closed-Form
* Step 5: Asymptotic Notation

## IDENTIFICATION OF BASIC OPERATION(S)

*Here, state clearly which operation(s) in the algorithm must be the basic operation(s). Also, you should provide a simple explanation about why you have decided on the basic operation you choose. (1-3 sentences)*

(2)

## REAL EXECUTION

### Best Case

|  |  |
| --- | --- |
| N Size | Time Elapsed |
| 1 | 0.00000476837158203125 |
| 5 | 0.000010967254638671875 |
| 10 | 0.00003814697265625 |
| 25 | 0.0002429485321044922 |
| 50 | 0.0011188983917236328 |
| 75 | 0.002679109573364258 |
| 100 | 0.004364013671875 |
| 150 | 0.011707067489624023 |
| 200 | 0.02629995346069336 |
| 250 | 0.036992788314819336 |

### Worst Case

|  |  |
| --- | --- |
| N Size | Time Elapsed |
| 1 | 0.0000011920928955078125 |
| 5 | 0.000041961669921875 |
| 10 | 0.00040078163146972656 |
| 25 | 0.013779878616333008 |
| 50 | 0.18341803550720215 |
| 75 | 0.9667437076568604 |
| 100 | 2.958270788192749 |
| 150 | 15.30362319946289 |
| 200 | 48.0098979473114 |
| 250 | 121.85824203491211 |

### Average Case

|  |  |
| --- | --- |
| N Size | Time Elapsed |
| 1 | 0.000002384185791015625 |
| 5 | 0.00003377596537272135 |
| 10 | 0.00031336148579915363 |
| 25 | 0.008852005004882812 |
| 50 | 0.09887814521789551 |
| 75 | 0.4282924334208171 |
| 100 | 1.199751853942871 |
| 150 | 6.5252476533253985 |
| 200 | 19.19698127110799 |
| 250 | 41.276151180267334 |

## COMPARISON

### Best Case

#### Graph of the real execution time of the algorithm

#### Graph of the theoretical analysis when basic operation is the operation marked as (1)

#### Graph of the theoretical analysis when basic operation is the operation marked as (2)

#### Graph of the theoretical analysis when basic operation is the operation marked as (3)

#### Graph of the theoretical analysis when basic operation is the operation marked as (4)

#### Graph of the theoretical analysis when basic operation is the operation marked as (5)

#### Comments

### Worst Case

#### Graph of the real execution time of the algorithm

#### Graph of the theoretical analysis when basic operation is the operation marked as (1)

#### Graph of the theoretical analysis when basic operation is the operation marked as (2)

#### Graph of the theoretical analysis when basic operation is the operation marked as (3)

#### Graph of the theoretical analysis when basic operation is the operation marked as (4)

#### Graph of the theoretical analysis when basic operation is the operation marked as (5)

#### Comments

### Average Case

#### Graph of the real execution time of the algorithm

#### Graph of the theoretical analysis when basic operation is the operation marked as (1)

#### Graph of the theoretical analysis when basic operation is the operation marked as (2)

#### Graph of the theoretical analysis when basic operation is the operation marked as (3)

#### Graph of the theoretical analysis when basic operation is the operation marked as (4)

#### Graph of the theoretical analysis when basic operation is the operation marked as (5)

#### Comments