T0316-Operating System

Assignment 3

1. Suppose the following shows the status of memory:

Note that the shaded area repesents allocated memory



Suppose a sequenceofprocess arrives in the following order:

P1: 3M

P2: 4M

P3: 6M

P4: 3M

Allocate the memory for the above process using:

1. First Fit algorithm

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 3M\* | 5M |  | 2M |  | 4M |  | 12M |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3M\* | 4M\* | 1M |  | 2M |  | 4M |  | 12M |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3M\* | 4M\* | 1M |  | 2M |  | 4M |  | 6M\* | 6M |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3M\* | 4M\* | 1M |  | 2M |  | 3M\* | 1M |  | 6M\* | 6M |

1. Best Fit algorithm

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 8M |  | 2M |  | 3M\* | 1M |  | 12M |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4M\* | 4M |  | 2M |  | 3M\* | 1M |  | 12M |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4M\* | 4M |  | 2M |  | 3M\* | 1M |  | 6M\* | 6M |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4M\* | 3M\* | 1M |  | 2M |  | 3M\* | 1M |  | 6M\* | 6M |

1. Worst Fit algorithm

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 8M |  | 2M |  | 4M |  | 3M\* | 9M |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8M |  | 2M |  | 4M |  | 3M\* | 4M\* | 5M |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6M\* | 2M |  | 2M |  | 4M |  | 3M\* | 4M\* | 5M |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6M\* | 2M |  | 2M |  | 4M |  | 3M\* | 4M\* | 3M\* | 2M |

1. Describe 4 types of threats

|  |  |
| --- | --- |
| **Unauthorized Disclosure**  A circumstance or event whereby an entity gains access to data for which the entity is not authorized. | **Exposure:** Sensitive data are directly released to an unauthorized entity.  **Interception:** An unauthorized entity directly accesses sensitive data, traveling between authorized sources and destinations.  **Inference:** A threat action whereby an unauthorized entity indirectly accesses sensitive data (but not necessarily the data contained in the communication) by reasoning from characteristics or by products of communications.  **Intrusion:** An unauthorized entity gains access to sensitive data by circumventing a system’s security protections. |
| **Deception**  A circumstance or event that may result in an authorized entity receiving false data and believing it to be true. | **Masquerade:** An unauthorized entity gains access to a system or performs a malicious act by posing as an authorized entity.  **Falsification:** False data deceive an authorized entity.  **Repudiation:** An entity deceives another by falsely denying responsibility for an act. |
| **Disruption**  A circumstance or event that interrupts or prevents the correct operation of system services and functions. | **Incapacitation:** Prevents or interrupts system operation by disabling a system component.  **Corruption:** Undesirably alters system operation by adversely modifying system functions or data.  **Obstruction:** A threat action that interrupts delivery of system services by hindering system operation. |
| **Usurpation**  A circumstance or event that results in control of system services or functions by an unauthorized entity. | **Misappropriation:** An entity assumes unauthorized logical or physical control of a system resource.  **Misuse:** Causes a system component to perform a function or service that is detrimental to system security. |

1. Consider the following references string 1,2,3,1,2,5,4,6,1,2,4,6

Using 3 memory frames, determine the number of page fault using the following replacement algorithm:

1. FIFO

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 1 | 2 | 5 | 4 | 6 | 1 | 2 | 4 | 6 |
| 1 | 1 | 1 | 1 | 1 | 5 | 5 | 5 | 1 | 1 | 1 | 6 |
|  | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 2 | 2 | 2 |
|  |  | 3 | 3 | 3 | 3 | 3 | 6 | 6 | 6 | 4 | 4 |
| P | P | P | - | - | P | P | P | P | P | P | P |

Page fault: 10

1. LRU

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 1 | 2 | 5 | 4 | 6 | 1 | 2 | 4 | 6 |
| 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 2 | 2 | 2 |
|  | 2 | 2 | 2 | 2 | 2 | 2 | 6 | 6 | 6 | 4 | 4 |
|  |  | 3 | 3 | 3 | 5 | 5 | 5 | 1 | 1 | 1 | 6 |
| P | P | P | - | - | P | P | P | P | P | P | P |

Page fault: 10

1. OPTIMAL

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 1 | 2 | 5 | 4 | 6 | 1 | 2 | 4 | 6 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 |
|  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
|  |  | 3 | 3 | 3 | 5 | 4 | 6 | 6 | 6 | 6 | 6 |
| P | P | P | - | - | P | P | P | - | - | P | - |

Page fault: 7

1. Clock

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 1 | 2 | 5 | 4 | 6 | 1 | 2 | 4 | 6 |
| 1\* | 1\* | -> 1\* | -> 1\* | -> 1\* | 5\* | 5\* | ->5\* | 1\* | 1\* | ->1\* | 6\* |
| -> | 2\* | 2\* | 2\* | 2\* | ->2 | 4\* | 4\* | ->4 | 2\* | 2\* | ->2 |
|  | -> | 3\* | 3\* | 3\* | 3 | ->3 | 6\* | 6 | ->6 | 4\* | 4 |
| P | P | P | - | - | P | P | P | P | P | P | P |

Page fault: 10

1. Suppose in a computer system there are 3 users and 4 files, U1, U2, U3 and F1, F2, F3, F4.

U1 has read adn write access to F1 and F4

U2 has read only access to F1, Read and write access to F2 and exeecute access on F3

U3 has read,write, execute access to F3, execut eonly to F2 and F4

Construct the protection matrix for this security system.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | F1 | F2 | F3 | F4 |
| U1 | read  write | - | - | read  write |
| U2 | read | read  write | execute | - |
| U3 | - | execute | read  write  execute | execute |