**ADVANCED OPERATING SYSTEM**

**Project 3 Report**

**DYNAMIC VOTING IN DISTRIBUTED SYSTEM**

Implementation of the **Jajodia-Mutchler voting algorithm** for dynamic votes in a distributed network where faults in the network are likely to happen, but consistency is important.

**Definition 1.** The version number of a copy fi at a server i is an integer VNi which counts the number of successful updates to fi. We set VNi to A initially and increment it by one each time an update to fi occurs.

**Definition 2**. The current version number of a replicated file f is the maximum taken over the version numbers of all copies of f.

**Definition 3.** A copy is said to be current if its version number equals the current version number of the replicated file.

**Definition 4.** A partition is said to be a majority partition if it contains more than half of the current copies of the replicated file f.

In this project, we have solved one example of Sequence of network state transitions.

**STEP 1:**

Initially 8 servers are given i.e. A, B, C, D, E, F, G, H.

A B C D E F G H

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F | G | H |
| VN | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| RU | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| DS | A | A | A | A | A | A | A | A |

After 2 writes on server A and server E

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F | G | H |
| VN | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| RU | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| DS | A | A | A | A | A | A | A | A |

**STEP 2:**

In this step, two partition of 8 server takes places. Server A, B, C, D(having latest version number) gets updated while remaining are same.

A B C D E F G H

E F G H

A B C D

2- Write Operation Happened:

|  |  |  |
| --- | --- | --- |
| Partition | WRITE SUCCESS | WRITE FAILS |
| ABCD | WRITE 1, WRITE 2 | - |
| EFGH | - | - |

Here Write 1 and Write 2 happened successfully in Partition ABCD. So, version number only increase by 2.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F | G | H |
| VN | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 |
| RU | 4 | 4 | 4 | 4 | 8 | 8 | 8 | 8 |
| DS | A | A | A | A | A | A | A | A |

**STEP 3:**

In this step, Partition A, B, C, D split into two more partition i.e. A and B, C, D. Also, E, F, G, H further split into E, F, G and H.

A B C D E F G H

A B C D

E F G H

A

B C D

E F G

H

2 Write Operation Happened:

|  |  |  |
| --- | --- | --- |
| Partition | WRITE SUCCESS | WRITE FAILS |
| A | - | WRITE 1 |
| BCD | WRITE 2 | - |
| EFG | - | - |
| H | - | - |

Here Write 2 happened successfully in Partition BCD, whereas Write 1 fails in partition A. So, version number only increase by 1.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F | G | H |
| VN | 4 | 5 | 5 | 5 | 3 | 3 | 3 | 3 |
| RU | 4 | 3 | 3 | 3 | 8 | 8 | 8 | 8 |
| DS | A | A | A | A | A | A | A | A |

**STEP 4:**

In this step server B, C, D merged with E, F, G. So the table is updated accordingly.

A B C D E F G H

A B C D

E F G H

A

B C D

E F G

H

B C D E F G

2- Write Operation Happened:

|  |  |  |
| --- | --- | --- |
| Partition | WRITE SUCCESS | WRITE FAILS |
| A | - | - |
| BCDEFG | WRITE 2 | - |
| H | - | WRITE 1 |

Here Write 2 happened successfully in Partition BCDEFG, whereas Write 1 fails in partition H. So, version number only increase by 1.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F | G | H |
| VN | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 3 |
| RU | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 8 |
| DS | A | B | B | B | B | B | B | A |