**Instituto Tecnológico de Aeronáutica**

**Engenharia Aeroespacial e Mecânica**



**CE-288**

**Programação Distribuída**

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**Exercício 1**

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1 – No algoritmo da Lamport (cap. III) para 3 processos (identificados por P0, P1 e P2), suponha a seguinte seqüência de eventos: processo 1 é o primeiro a desejar a exclusão mútua. O processo 0 deseja exclusão depois de enviar o *ack* para o processo 1.

Complete o processamento abaixo dos 3 processos para **cada** mensagem recebida (seja do seu processo P ou dos processos S) descrevendo os novos valores de variáveis de estado (*m, state*, *q* e *granted*). Antes, verifique se o processamento abaixo está correto.

Suponha a comunicação inter-processos tenha a mesma duração, mesmo que a comunicação seja de um processo para ele mesmo. Caso exista mais uma mensagem para ser processada, a mensagem do processo de identificador mais alto (P2, em seguida P1, e por último P0) será tratada primeiro.

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|  | P0 | | | P1 | | | P2 | | |
|  | m =  state = (?, 0, 0)  granted = false | | | m =  state = (?, 0, 1)  granted = false | | | m =  state = (?, 0, 2)  granted = false | | |
| q | T | c | q | T | c | Q | t | C |
| 0 | rel | 0 | 0 | rel | 0 | 0 | rel | 0 |
| 1 | rel | 0 | 1 | rel | 0 | 1 | rel | 0 |
| 2 | rel | 0 | 2 | rel | 0 | 2 | rel | 0 |
| Fila para Min = | | | Fila para Min = | | | Fila para Min = | | |
| 1 |  | | | Recebe signal em release | | |  | | |

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|  | m =  state = (?, 0, 0)  granted = false | | | m =  state = (req, 1, 1)  granted = false | | | m =  state = (?, 0, 2)  granted = false | | |
| q | T | c | q | T | c | Q | t | C |
| 0 | rel | 0 | 0 | rel | 0 | 0 | rel | 0 |
| 1 | rel | 0 | 1 | req | 1 | 1 | rel | 0 |
| 2 | rel | 0 | 2 | rel | 0 | 2 | rel | 0 |
| Fila para Min =  (req, 1, 1) | | | Fila para Min = (req,1,1) | | | Fila para Min =  (req, 1, 1) | | |
| 2 | Recebe (req,1,1) | | | Recebe (req,1,1) | | | Recebe (req,1,1) | | |

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|  | m = (req, 1, 1)  state = (ack, 2, 0)  granted = false | | | m = (req, 1, 1)  state = (ack, 2, 1)  granted = false | | | m = (req, 1, 1)  state = (ack, 2, 2)  granted = false | | |
| q | T | c | q | T | c | Q | t | c |
| 0 | rel | 0 | 0 | rel | 0 | 0 | rel | 0 |
| 1 | req | 1 | 1 | req | 1 | 1 | req | 1 |
| 2 | rel | 0 | 2 | rel | 0 | 2 | rel | 0 |
| Fila para Min = | | | Fila para Min = (ack, 2,0)  (ack, 2,1)  (ack, 2,2) | | | Fila para Min = | | |
| 3 |  | | | Recebe (ack, 2, 2) | | |  | | |

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|  | m =  state = (ack, 2, 0)  granted = false | | | m = (ack, 2, 2)  state = (rel, 3, 1)  granted = true | | | m =  state = (ack, 2, 2)  granted = false | | |
| q | T | c | q | T | c | Q | t | c |
| 0 | rel | 0 | 0 | rel | 0 | 0 | rel | 0 |
| 1 | req | 1 | 1 | rel | 3 | 1 | req | 1 |
| 2 | rel | 0 | 2 | rel | 0 | 2 | rel | 0 |
| Fila para Min =  (rel, 3, 1) | | | Fila para Min =  (rel, 3, 1) | | | Fila para Min =  (rel, 3, 1) | | |
| 4 | Recebe (rel, 3, 1) | | | Recebe (rel, 3, 1) | | | Recebe (rel, 3, 1) | | |

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|  | m = (rel, 3, 1)  state = (req, 4, 0)  granted = false | | | m = (rel, 3, 1)  state = (ack, 3, 1)  granted = false | | | m = (rel, 3, 1)  state = (ack, 2, 2)  granted = false | | |
| q | T | c | q | T | c | Q | t | c |
| 0 | req | 4 | 0 | rel | 0 | 0 | rel | 0 |
| 1 | rel | 3 | 1 | rel | 3 | 1 | rel | 3 |
| 2 | rel | 0 | 2 | rel | 0 | 2 | rel | 0 |
| Fila para Min =  (req, 4, 0) | | | Fila para Min =  (req, 4, 0) | | | Fila para Min =  (req, 4, 0) | | |
| 5 | Recebe (req, 4, 0) | | | Recebe (req, 4, 0) | | | Recebe (req, 4, 0) | | |

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|  | m = (req, 4, 0)  state = (ack, 5, 0)  granted = false | | | m = (req, 4, 0)  state = (ack, 5, 1)  granted = false | | | m = (req, 4, 0)  state = (ack, 5, 2)  granted = false | | |
| q | T | c | q | T | c | Q | t | C |
| 0 | req | 4 | 0 | rel | 4 | 0 | rel | 4 |
| 1 | rel | 3 | 1 | rel | 3 | 1 | rel | 3 |
| 2 | rel | 0 | 2 | rel | 0 | 2 | rel | 0 |
| Fila para Min =  (ack, 5, 0)  (ack, 5, 1)  (ack, 5, 2) | | | Fila para Min = | | | Fila para Min = | | |
| 6 | Recebe (ack, 5, 2) | | |  | | |  | | |

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|  | m =  state = (ack, 5, 0)  granted = true | | | m =  state = (ack, 5, 1)  granted = false | | | m =  state = (ack, 5, 2)  granted = false | | |
| q | T | c | q | T | c | Q | t | C |
| 0 | req | 4 | 0 | rel | 4 | 0 | rel | 4 |
| 1 | rel | 3 | 1 | rel | 3 | 1 | rel | 3 |
| 2 | rel | 0 | 2 | rel | 0 | 2 | rel | 0 |
| Fila para Min = | | | Fila para Min = | | | Fila para Min = | | |
| 7 |  | | |  | | |  | | |