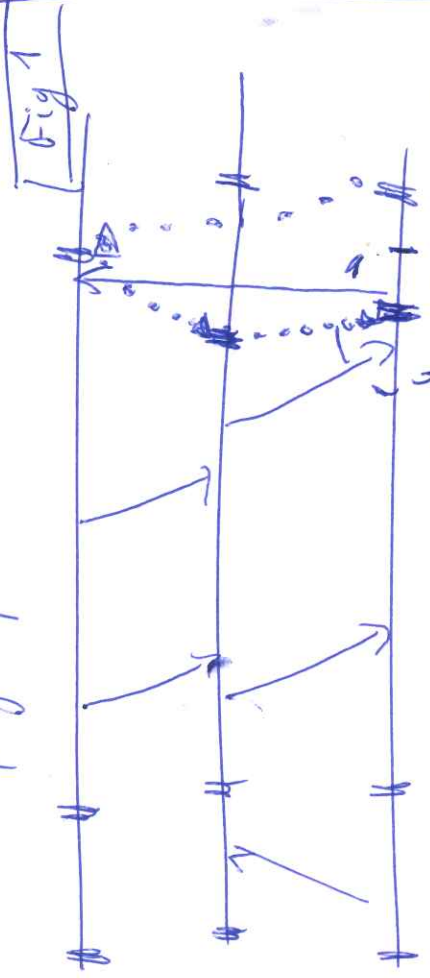


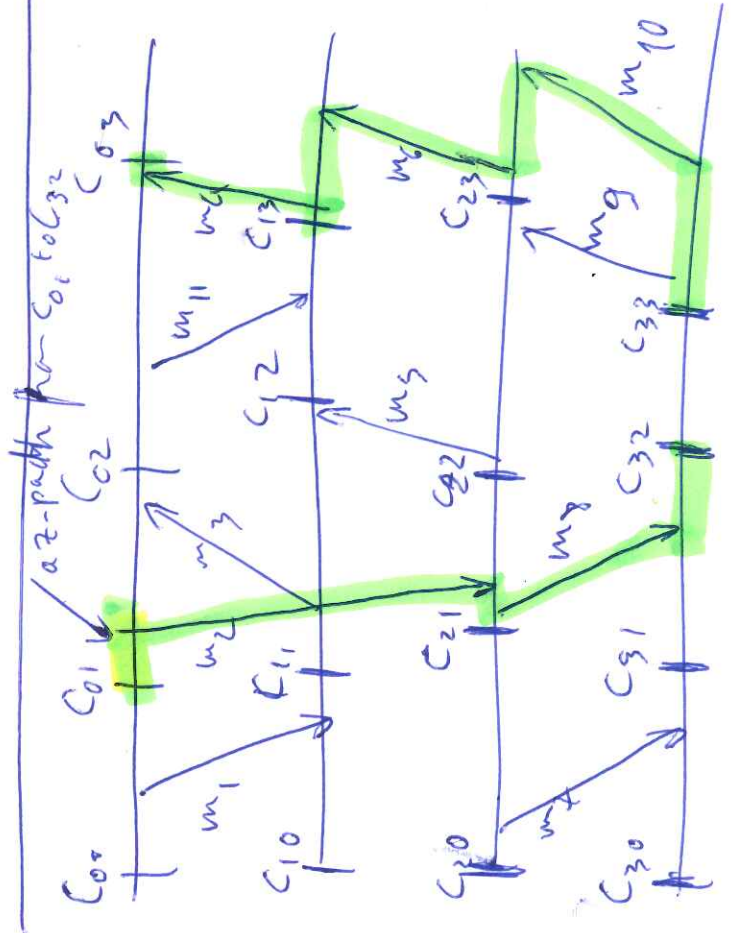
Z-paths

Dependency graph: ...



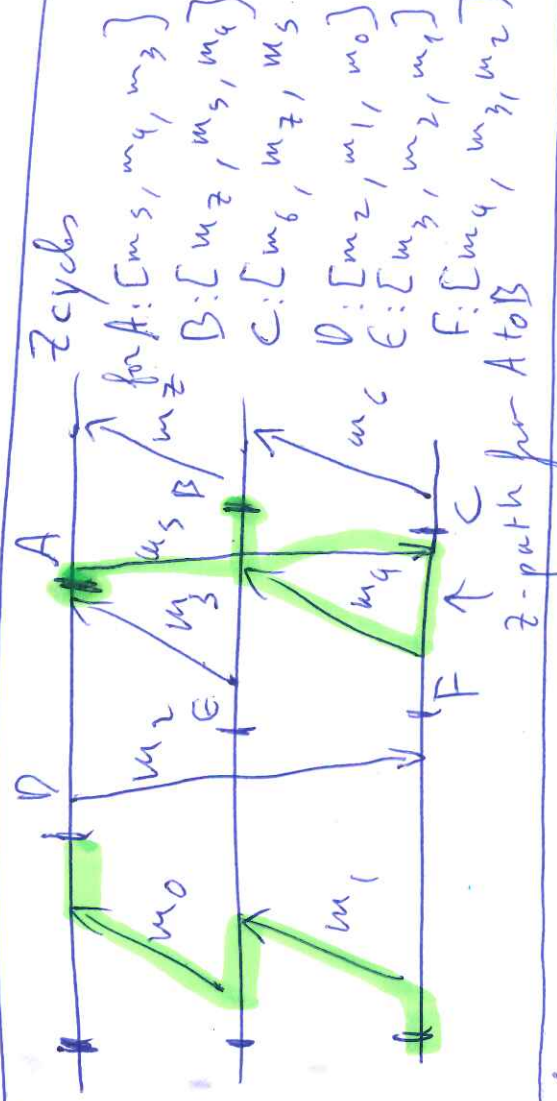
[Fig 1]

USELESS CHECKPOINT



Z-cycles

- for  $C_{22} : [m_5, m_3, m_2]$
- for  $C_{32}$  and  $C_{33} : [m_4, m_5, m_3, m_2, m_1]$
- for  $C_{13} : [m_4, m_{11}]$



checkpoints in Z-cycles are useless because the cycle implies that the dependency graph has a set of dependencies from a checkpoint to a previous checkpoint on the same process, implying that if one of the two checkpoints cannot be used, the previous one(s) cannot be used neither at recovery