

ECE 428 MP1 Design Documentation

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Abstract

1 Introduction

2 Methods

2.1 Proof of Causal Ordering

2.2 Proof of Reliable Multicast

The reliable multicast algorithm utilized in this implementation is described below:

Here, we prove the properties of reliable multicast. For correct processes:

1. Integrity: Each message delivered at most once. The process is a member of the message's multicast group, and the message was sent by its claimed sender.
2. Validity: Eventual delivery of all sent messages to own process.
3. Agreement: If a message is delivered to one process, it is delivered to all.

2.2.1 Integrity

2.3 Proof of Failure Detection

3 Conclusion

Input: Multicast group g , message m , sequence number s ,
acknowledgment set A , indexed by $p \in g$.
Output: New sequence number $s + 1$.
for *each* $p \in g$ **do**
 $m' = \text{piggyback}(s, A, m)$;
 $\text{unicast}(p, m')$;
end

Algorithm 1: Reliable multicast send

Input: Source p_s , message m' , Hold-back queue Q .
Output: No output. Updates hold-back queue Q .
 $\{s, A, m\} = \text{unpiggyback}(m')$;
if $s == Q[p_s] + 1$ **then**
 $\text{deliver}(m)$;
else if $s \leq Q[p_s]$ **then**
 $\text{discard}(m)$;
else if $s > Q[p_s] + 1$ **then**
 $\text{holdback}(m, Q)$;
else if $\exists p \in A$ *such that* $A[p] > Q[p]$ **then**
 $\text{negativeAcknowledge}(m)$;
else
 end

Algorithm 2: Reliable multicast receive