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A distributed system comprising of processes is synchronous iff it has the following properties[1]

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In such systems, there is no time assumptions about processes. That is, we do not have **physical clock**. Instead **Time** is defined with respect to communication and measured by a *Logical clock*.

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For event e_1 and e_2 we say "e_1 *has happened before* e_2" ($e_1 \to e_2$) if e_1 and e_2 have the following conditions:

1. e_1 and e_2 occurred at the **same process p** and e_1 occurred before e_2 (i.e. $t(e_2) = t(e_1) + 1$)
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- event is something such as sending or receiving message.
- there exists some event e' s.t. $e_1 \to e'$ and $e' \to e_2$

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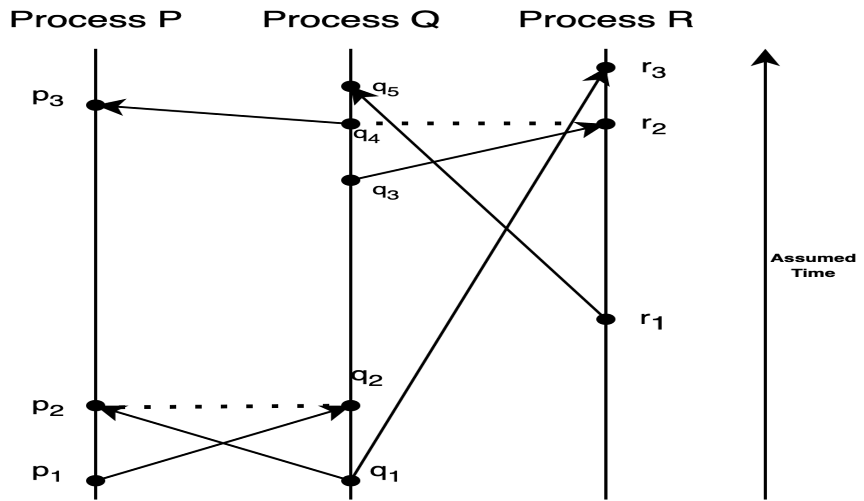

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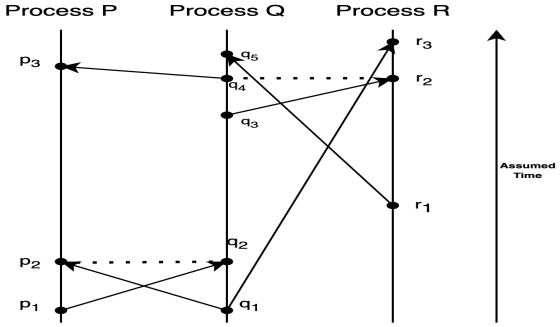

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This Algorithm describes the implementation of a
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For example, the adversary cannot produce a valid signature of a non-faulty node, compute the information summarized by a digest from the digest, or find two messages with the same digest. The cryptographic techniques we use are thought to have these properties

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-$delay(t)$ is the time between the moment when a message is sent for the first time and the moment when it is received by its destination (assuming the sender keeps retransmitting the message until it is received)

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- If the primary doesn't multicast the request to the group, it will eventually be suspected to be faulty by enough replicas to cause a view change.

PBFT Alg. Cont.

- The client waits for $f + 1$ replies with valid signatures from different replicas, and with the same t and r, before accepting the result r
- If client doesn't receive replies soon, it broadcasts the request to all replicas.
- If the request has already been processed, the replicas simply re-send the reply;
- otherwise, if the replica is not the primary, it relays the request to the primary.
- If the primary doesn't multicast the request to the group, it will eventually be suspected to be faulty by enough replicas to cause a view change.

Thank you for your attention!

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