

Distributed Algorithms Coursework

Gareth Jones & Osama Javed

March 1, 2013

Abstract

The following document contains the writeup for our Distributed Algorithms Coursework which focuses on *faliure detectors* - specifically in an *asynchronous* or *partially synchronous* message-passing system with crash faliures.

1 Failure Detectors

A *failure detector* is a module that provides to each process a collection of *suspected* processes. Detectors in different process may not agree on which processes are suspected.

1.1 Degrees of Completeness

Strong Completeness

Every faulty process is eventually permanently suspected by every non-faulty process

Weak Completeness

Every faulty process is eventually permanently suspected by some non-faulty process

1.2 Degrees of Accuracy

Strong accuracy - No process is suspected (by anybody) before it crashes
Weak accuracy - Some non-faulty process is never suspected

Eventual Strong Accuracy - After some initial period of confusion, no process is suspected before it crashes. This means no non-faulty process is suspected after some time, since we can take the end of the initial period of chaos as the time at which the last crash occurs.

Eventual weak accuracy - After some initial period of confusion, some non-faulty process is never suspected.

1.3 Failure Detector Classes

Perfect Detector

Strongly complete and strongly accurate: non-faulty processes are never suspected; faulty processes are eventually suspected by everybody. Easily achieved in synchronous systems.

Strong detector

Strongly complete and weakly accurate. The name is misleading if we've already forgotten about weak completeness, but the corresponding W (weak) class is only weakly complete and weakly accurate, so it's the strong completeness that the S is referring to.

Eventually Perfect

Strongly complete and eventually strongly accurate.

Eventually Strong

Strongly complete and eventually weakly accurate.