

Finer garbage collection in LINDACAP.

Abstract

As open systems persist, garbage collection (GC) can be a vital aspect in managing system resources. Although garbage collection has been proposed for the standard Linda, it was a rather course-grained mechanism. This finer-grained method is offered in Lindacap, a capability-based coordination system for open distributed systems. Multicapabilities in Lindacap enable tuples to be uniquely referenced, thus providing sufficient information on the usability of tuples (data) within the tuple-space. This paper describes the garbage collection mechanism deployed in Lindacap, which involves selectively garbage collecting tuples within tuple-spaces. The authors present the approach using reference counting, followed by the tracing (mark-and-sweep) algorithm to garbage collect cyclic structures. A time-to-idle (TTI) technique is also proposed, which allows for garbage collection of multicapability regions that are being referred to by agents but are not used in a specified length of time. The performance results indicate that the incorporation of garbage collection techniques adds little overhead to the overall performance of the system. The difference between the average overhead caused by the mark-and-sweep and reference counting is small, and can be considered insignificant if the benefits brought by the mark-and-sweep is taken into account.

Keyword: Capabilities; Garbage collection; LINDA coordination, Multicapabilities; Time-to-idle