

一個用以解決工作匹配與排程問題之平行化螞蟻系統設計與實作

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摘要

近年來，以個人電腦叢集 (PC Cluster) 所構成之低成本且支援平行處理的高效能運算平台已經引起廣泛的重視。由於在此一平台上所執行的平行應用程式係由許多的工作所組成，因此，為了讓此一平台上的計算資源可以被充分利用，一個有效的工作匹配與排程演算法，無疑地將成為高效能運算得以實現的重要技術。本文中，我們以快速螞蟻系統(Fast Ant System, FANT) 的設計方法為基礎，提出一個名為 FANT-TMS (Fast Ant System for Task Matching and Scheduling) 且應用在工作匹配與排程問題求解之平行演算法。此一方法旨在有效地決定各個工作在執行時期的順序，並且將工作分派給叢集運算環境中合適的處理單元(processing element, PE) 執行。FANT-TMS 採用一種間接解的表示方法用以降低演算法在執行時期的複雜度。相較於以基因演算法為基礎的工作匹配與排程技術，實驗結果顯示，本文所提出之 FANT-TMS 演算法確實優於傳統的方法。此外，為了強化演算法的執行效能，我們亦提出一種嶄新的區域搜尋方法。實驗結果亦呈現出此一設計方法的優異性。

關鍵詞：個人電腦叢集；工作匹配與排程；螞蟻系統；區域搜尋方法；基因演算法

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