

ขั้นตอนวิธีจัดกลุ่มกระบวนการที่ใช้พลังงานอย่างมีประสิทธิภาพสำหรับระบบแบบกระจาย



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ENERGY-EFFICIENT PROCESS CLUSTERING ASSIGNMENT ALGORITHM FOR  
DISTRIBUTED SYSTEM

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A Dissertation Submitted in Partial Fulfillment of the Requirements  
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Information Technology

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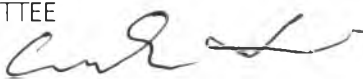
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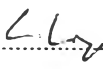
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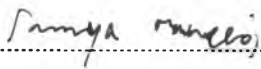
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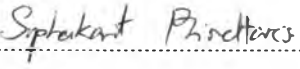
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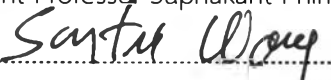
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อนันต์ นิยม : ขั้นตอนวิธีจัดกลุ่มกระบวนการที่ใช้พลังงานอย่างมีประสิทธิภาพสำหรับระบบแบบกระจาย. (ENERGY-EFFICIENT PROCESS CLUSTERING ASSIGNMENT ALGORITHM FOR DISTRIBUTED SYSTEM) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร.พีระพันธ์ โสพิศสถิตย์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: ศ. ดร.ชิตชนก เหลือสินทรัพย์, 108 หน้า.

วิทยานิพนธ์นี้เสนอขั้นตอนวิธีจัดการที่ใช้พลังงานอย่างมีประสิทธิภาพสำหรับระบบจัดกำหนดการแบบกระจายสองขั้นตอนคือ ขั้นตอนแรกดำเนินการโดยระเบียบวิธี energy-efficient process clustering assignment (EPC) ซึ่งจัดการใช้พลังงานอย่างมีประสิทธิภาพในระหว่างกระบวนการประมวลผล, การเดินเครื่องเปล่า และ การส่งผ่านข้อมูลของแต่ละหน่วยประมวลผล ขั้นตอนที่สองใช้ energy-sufficiency level assignment (ESL) ซึ่งเน้นลดเวลาที่ใช้ในการจัดกำหนดการ โดยเฉพาะภารกิจที่จำเป็นต้องประมวลผลในหน่วยประมวลผลที่กำหนดเท่านั้น ในการทดลองได้จำลองสถานการณ์ให้ใกล้เคียงกับความเป็นจริง โดยกำหนดให้แต่ละหน่วยประมวลผลมีความสามารถในการจัดการแต่ละภารกิจแตกต่างกัน อีกทั้งความต้องการพลังงานของแต่ละหน่วยประมวลผลก็แตกต่างกันด้วย รวมถึงข้อจำกัดด้านพลังงานของแต่ละหน่วยประมวลผล โดยเฉพาะหน่วยประมวลผลหลักที่ต้องมีพลังงานเพียงพอ สำหรับรอผลการดำเนินงานจากหน่วยประมวลผลย่อยอื่นๆ ด้วย จากการทดลองพบว่าระเบียบวิธี EPC ให้ผลรวมของการใช้พลังงานในหน่วยประมวลผลอยู่ในเกณฑ์ที่ดี และขั้นตอนวิธี ESL ลดเวลาของการจัดกำหนดการได้ดีเมื่อเทียบกับขั้นตอนวิธีของงานวิจัยอื่น และให้พลังงานของการจัดกำหนดการที่ต่ำ อีกทั้งยังสามารถจัดกำหนดการในระบบที่มีพลังงานจำกัดได้อีกด้วยทำให้พลังงานรวมที่ใช้ลดตามไปด้วย



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In this thesis, two scheduling algorithms for distributed scheduling assignment are proposed to address the issue on energy consumption. The first algorithm is an energy-efficient process clustering assignment (EPC) algorithm which aims at efficient energy consumption during process execution, system idling, and data transmission. The second algorithm is an energy-sufficiency level assignment (ESL) algorithm which aims at reducing scheduling time, in particular, tasks that can only be executed on some designated processing units. Simulation results showed that the EPC algorithm yielded satisfactory energy consumption during processes, while the ESL algorithm reduced task scheduling time and energy considerably in comparison with other existing algorithms. The proposed algorithms can also handle scheduling assignment under limited power supply. As a consequence, total energy consumption decreases.



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