

雲端熱管理技術研究

執行單位

國立交通大學

計畫主持人

王啟川

- 本計畫主要目的是針對機房與機櫃的熱管理技術進行開發，並訓練與培育雲端運算之能源管理人才與相關熱管理技術，期待能將改善與創新的技術應用於日益漸增的雲端系統上。

專利申請

已獲得2項專利:

★ 散熱模組：專利證號
發明第I556376號

★ 散熱鰭片組：專利證號
發明第I564511號

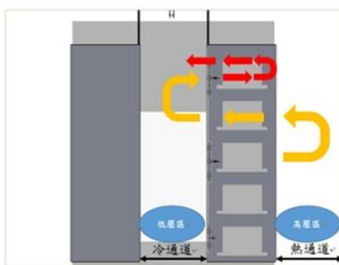
另有5項專利申請中

技術移轉

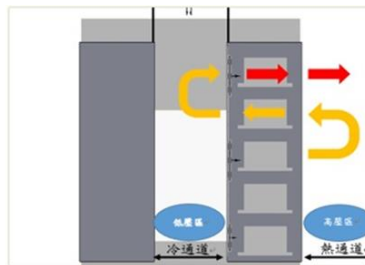
技術名稱：「機房空調與散熱設計技術」

技轉金額：200萬元

執行期間：104.1~105.12

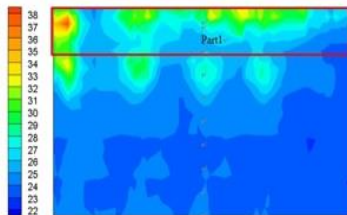


(a)機房內空氣流動示意圖(實驗)



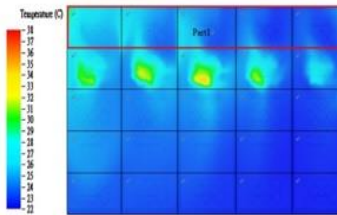
(b)機房內空氣流動示意圖(模擬)

實驗與模擬機房內空氣流動示意圖

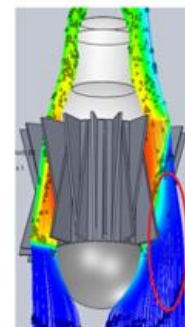


(a)A1~E1 機櫃溫度分佈圖(實驗)

實驗與模擬機櫃入口面溫度分佈圖



(b)A1~E1 機櫃溫度分佈圖(模擬)



交錯排列設計之散熱鰭片

超過70%的全球前1000企業都將在今後5年內對數據中心的設備進行更新與擴展，應用和運算密度的快速增長，使得資本壓力不斷上升，數據中心的電力消耗在過去10年增長了5倍，通常IT儀器僅占整體能耗的四成上下，其他空調送風與散熱及其他 infrastructure 則達六成的能耗，可見Infrastructure 能耗設計的重要性可見一斑；且貨櫃型數據中心因造價便宜且具機動性未來將有70%市場需求率。

本整合計畫，以三年執行模擬與實驗分析機房機櫃的散熱效率研究與改善，規劃的三項主要工作如下：

子計畫一：機房氣流熱管理

子計畫二：機櫃與機箱層級之節能研究

子計畫三：高功率晶片冷卻



Investigation of thermal management of cloud computing

Execution Unit

National Chiao Tung University

Project Director

Chi-Chuan Wang

- The main purpose of this project is to develop the thermal management technology applicable for the data centers and to cultivate the thermal energy managements effectively and efficiently. The developed technologies include airflow managements, innovative methods for electronic cooling in servers/chips.

Patent application

Two patents have been obtained:

- ★ Thermal module:
Patent number: I556376
- ★ Thermal Fin:
Patent number: I564511

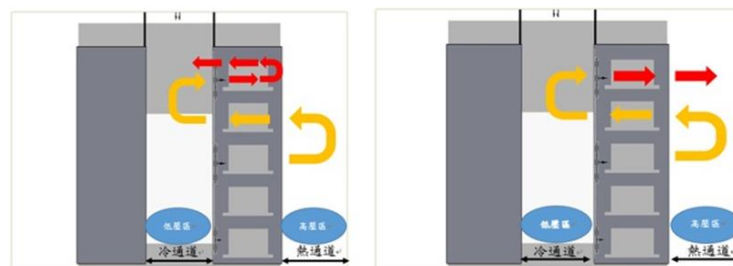
Another five patents are still pending.

Technology transfer

Technology name: "The thermal management technology and development of the data center"

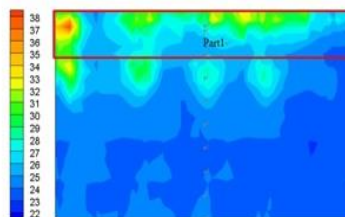
Technology transfer amount:
2 million dollars

Implementation period: 104.1~105.12



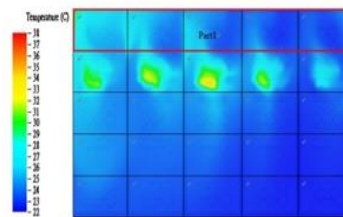
(a)機房內空氣流動示意圖(實驗) (b)機房內空氣流動示意圖(模擬)

實驗與模擬機房內空氣流動示意圖

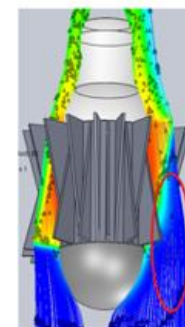


(a)A1~E1 機櫃溫度分佈圖(實驗)

實驗與模擬機櫃入口面溫度分佈圖



(b)A1~E1 機櫃溫度分佈圖(模擬)



交錯排列設計之散熱鳍片

About 40% of the power consumption is for IT equipments in typical data center while the rest 60% of the energy is consumed by the associated infrastructure (HVAC&R, cooling, lighting, UPS and the like). Yet the rise of power consumption prevails in the coming years. In this regard, energy and thermal management of the datacenter is imperative and requires further innovative efforts. As a consequence, the objective of the overall project is seeking innovative ways to resolve this issue in the following aspects:

- (1) Optimization of the cooling and airflow arrangement at room level.
- (2) Thermal management of the cooling design at the rack/server level.
- (3) Thermal management for high flux electronic chip.