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Domino Cluster 的資料同步和抄寫技術

沈偉 | IBM 高級軟體工程師

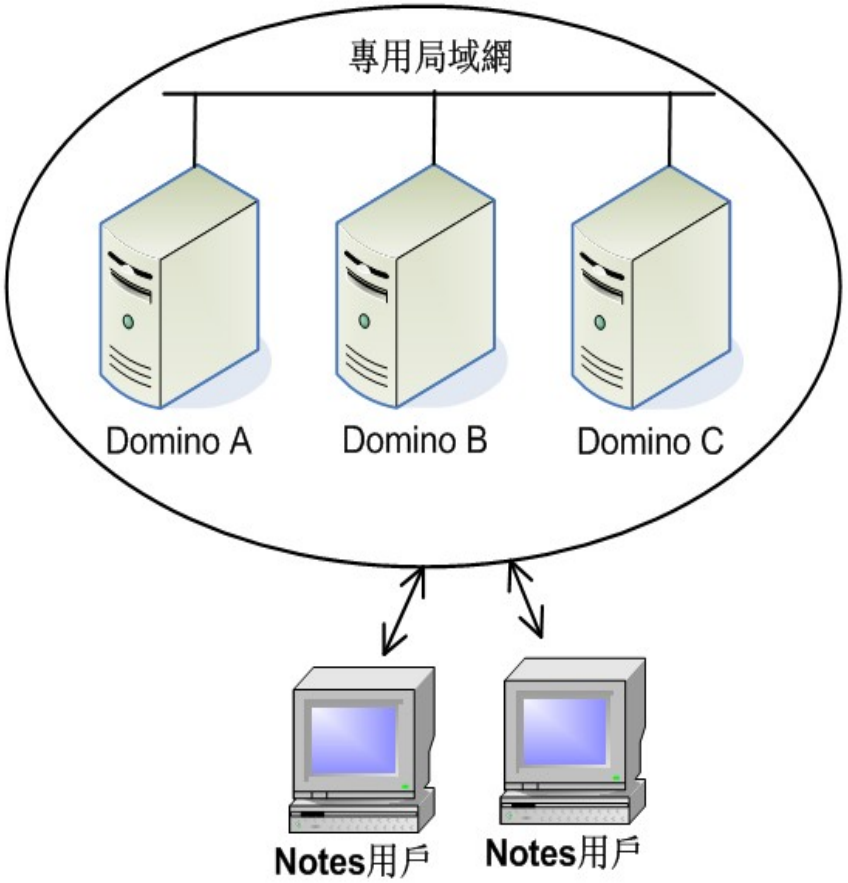
lotusknows.com

綱要

- Domino Cluster
- 容錯移轉和負載均衡
- Cluster 內的資料庫抄寫
- Cluster 的規劃、創建和監控

Domino Cluster

- 兩個或以上 Domino
- 屬於同一 Domino 域
- 磁片，CPU 資源較多
- 高速局域網
- 推薦同一版本



Domino Cluster 的好處

- 提高資料庫可用性
  - 容錯移轉
  - 重要資料庫
- 負載均衡
  - 提高存取速度，優化性能
- 利於資料備份、災備
- 利於硬體、作業系統和 Domino 伺服器升級
- 提高系統可擴展性
- .....

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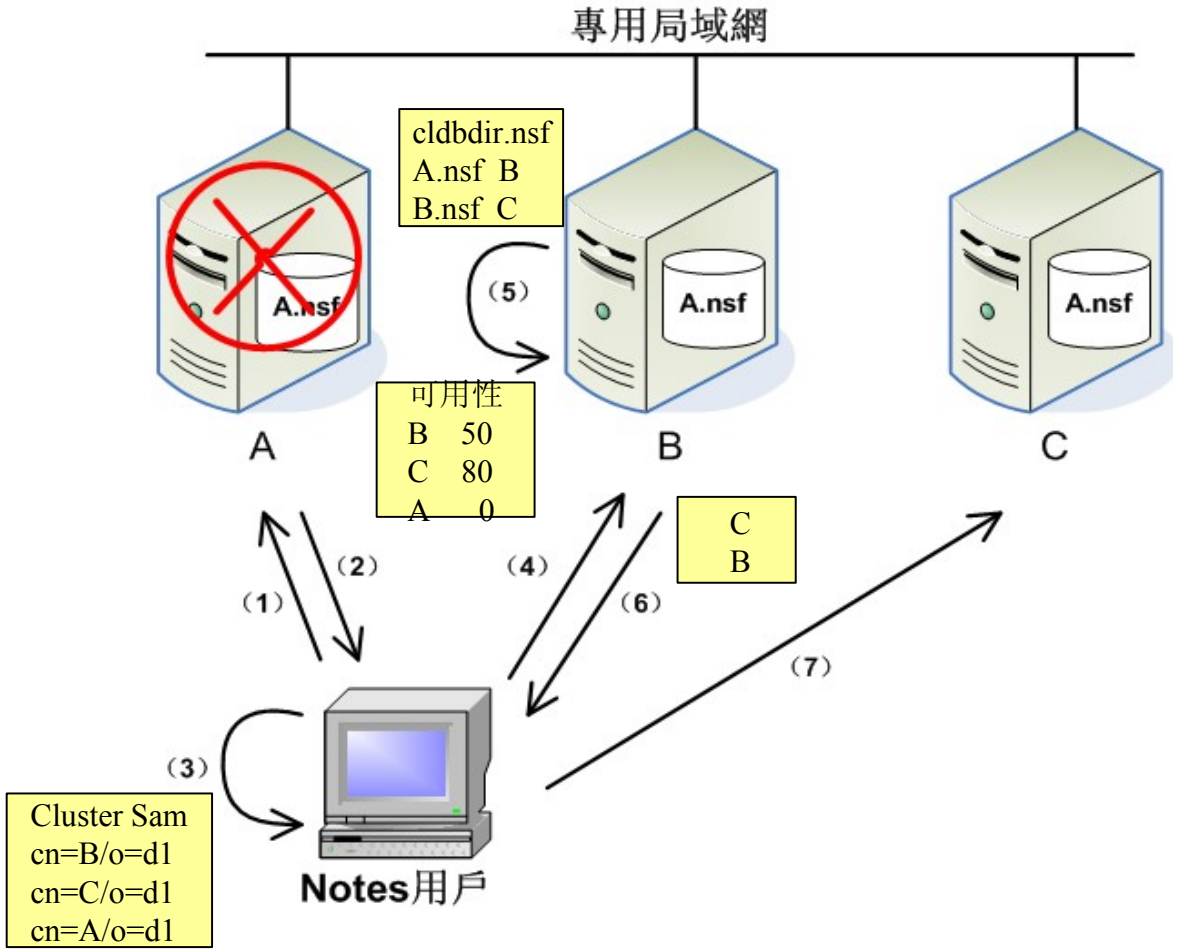
觸發容錯移轉

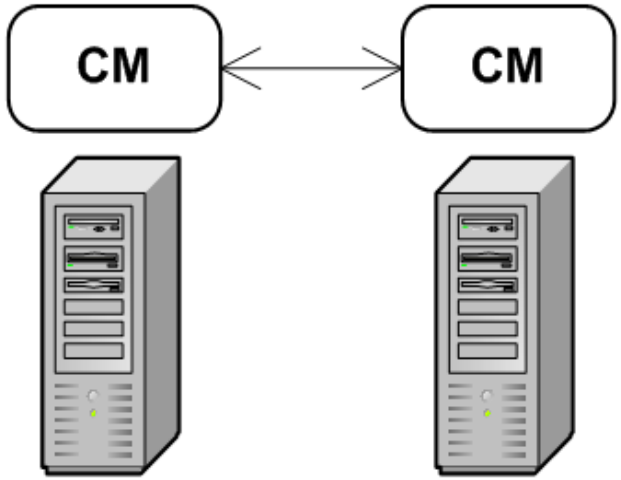
類別	觸發容錯移轉的動作
打開資料庫操作	從書簽打開一個資料庫
	點擊文檔連結、視圖連結或者資料庫連結
	索引伺服器無法工作時使用域搜索
	漫遊伺服器無法工作時訪問漫遊文件
	啟動包含 @command([FileOpenDatabase]) 的域，動作或按鈕
	LS 中調用 NotesDatabase 類的 OpenWithFailover 方法
	Java 中調用 DbDirectory 類的 OpenDatabase 方法
	複製資料庫時目標伺服器不可用
郵件伺服器相關操作	發送郵件時
	查找名字時
	Type-ahead
	路由郵件時
	郵件預發送代理
	會議邀請
	閒置時間查找
	伺服器查找
Web 伺服器操作	選中打開 URL 的圖示
	點擊一個 URL 熱點
	Web 流覽器中訪問 URL

Cluster 中的容錯移轉



(1) Notes 打開 Domino A 上 A.nsf
(2) 沒有回應
(3) Notes 查找本地 cluster.ncf，讀取與 A 同一群集的第一個 Domino 伺服器 (B)
(4) Notes 訪問 B
(5) B 找出群集中含 A.nsf 的 Domino 伺服器清單 (按可用性高低排序)
(6) B 將列表發送給 Notes
(7) Notes 打開列表上第一個 Domino 伺服器 (C) 上的 A.nsf

Cluster Manager (CM)



- 向 cluster 其他伺服器發送心跳
  - 伺服器的可用性
- 監聽其他 CM 發送的心跳
  - 在緩存中更新
- 監控其他伺服器的可用性
- 向 Notes 發送可用伺服器列表
- 定期監控伺服器文檔，維護 cluster 列表
- 往伺服器日誌中寫入容錯移轉、負載均衡事件

Cluster 資料庫目錄 (Cluster Database Directory)

- CLDBDIR.NSF
  - 每個文檔包含一個資料庫資訊，包括資料庫名字，伺服器名字，路徑， replica ID 等
  - 存在于 cluster 中每個伺服器上，互為 replica
- 維護
  - 由 cluster 資料庫目錄管理器 (Cluster Database Directory Manager) 創建
  - 資料庫更新及時
  - replicate 及時 (cluster replicator)

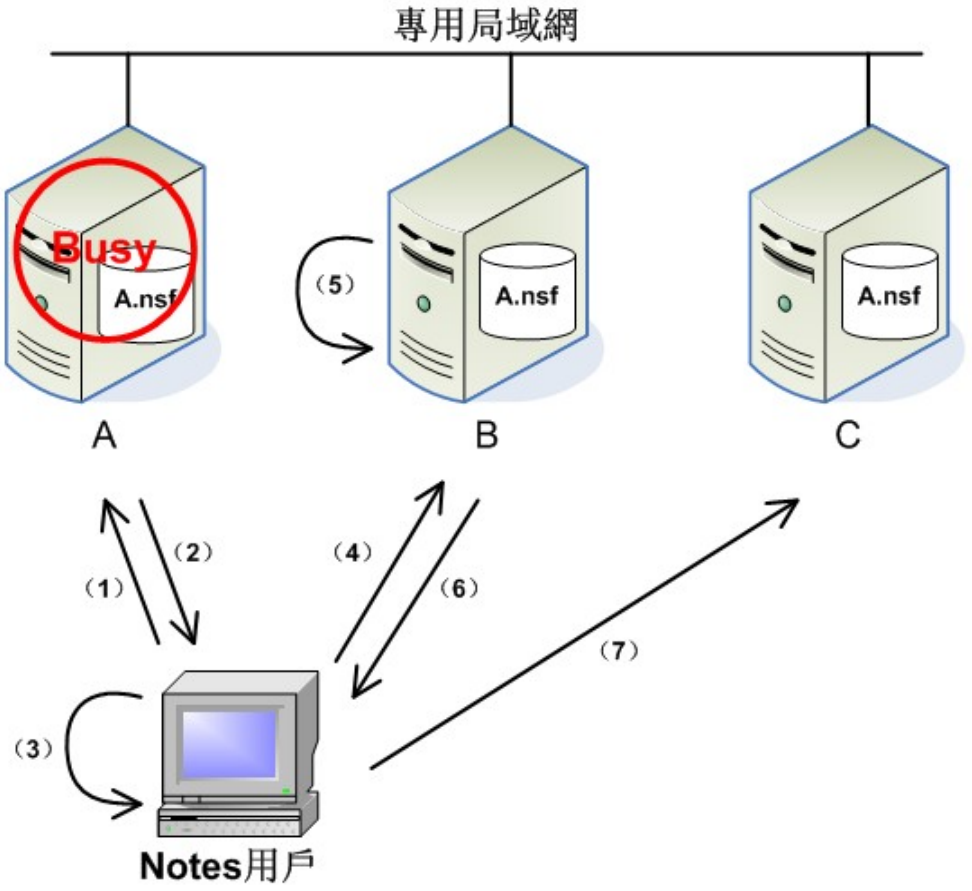
其他組件

- Cluster Replicator
  - 即時 replicate
  - 一個或多個
- Cluster Administrator
  - 啟動 / 關閉 cluster 資料庫目錄， cluster replicator
  - 清除 cluster 資料庫目錄

負載均衡

- 可用性閥值
- 最大用戶數

(1) Notes 打開 Domino A 上 A.nsf
(2) A 回應“伺服器忙”
(3) Notes 查找本地 cluster.ncf，讀取與 A 同一群集的第一個 Domino 伺服器 (B)
(4) Notes 訪問 B
(5) B 找出群集中含 A.nsf 的 Domino 伺服器清單 (按可用性高低排序)
(6) B 將列表發送給 Notes
(7) Notes 打開列表上第一個 Domino 伺服器 (C) 上的 A.nsf



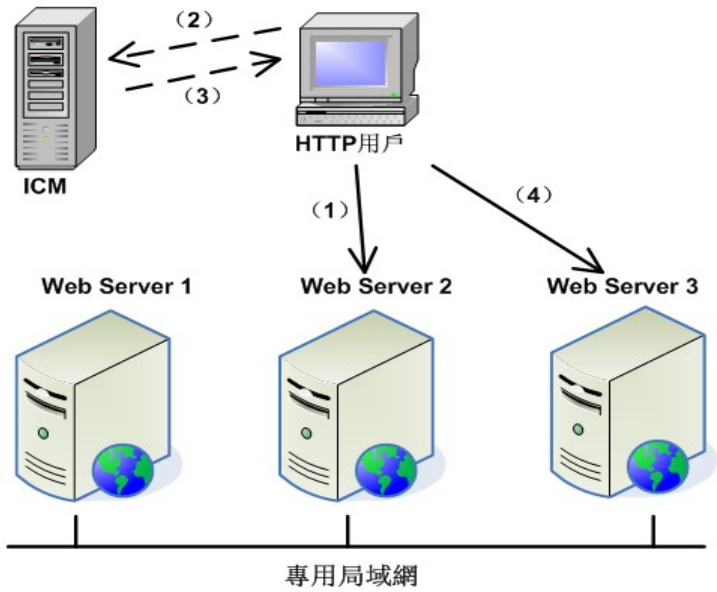
伺服器可用性 (availability)

- 可用性索引值
  - 0 ~ 100， 100 可用性最大
  - 當前交易處理平均時間 / 交易處理最小時間 (loadmon.ncf)
- 可設置閥值
  - SERVER_AVAILABILITY_THRESHOLD

```
OPEN_DB = 291.8
CLOSE_DB = 52.4166666666667
GET_NOTE_INFO = 95.5294117647059
OPEN_NOTE = 112.125
READ_OBJECT = 84.2
NIF_OPEN_NOTE = 3000000
GET_OBJECT_SIZE = 129
DB_INFO_GET = 69.4
DB_REPLINFO_GET = 64.6666666666667
DB_READ_HIST = 3000000
DB_WRITE_HIST = 3000000
GET_SPECIAL_NOTE_ID = 68.3333333333333
```

Web Server Cluster

- Web 伺服器
  - 收到 HTTP 請求後，查看伺服器文檔得到 ICM 位址
  - 生成指向 ICM 的 URL
- Internet Cluster Manager(ICM)
  - 負責重定向 HTTP 請求
  - 週期性向 cluster 內 web 伺服器發送探針，獲取資訊
  - 將最可用的 relica 連結返回給 HTTP 用戶端
  - 可在 cluster 外



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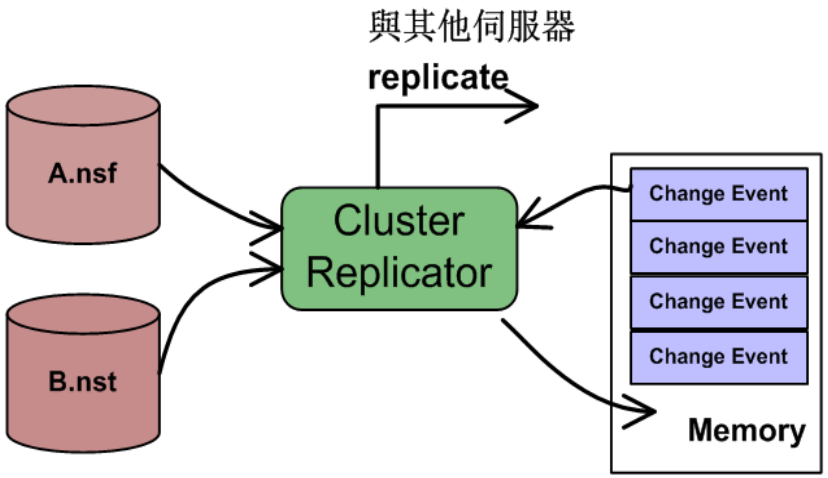
cluster 資料庫抄寫

- 保持資料庫 replica 一致
- 容錯移轉、負載均衡實現的基礎
- 時延性要求高

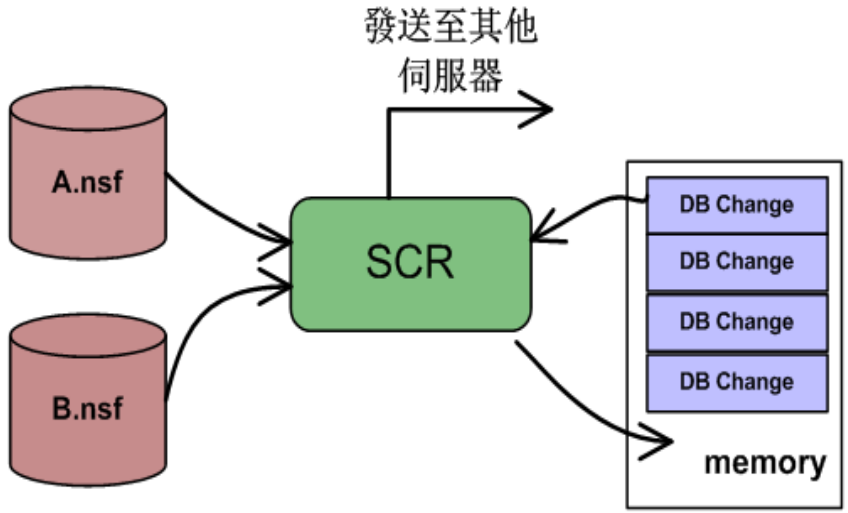
Replication in Cluster(8.0 版本以前)

- 事件驅動
  - 探測到變化，立刻 replicate
  - 將事件加入到記憶體中的佇列
  - 讀出事件，和 cluster 其他伺服器 replicate
- 事件僅保存在記憶體中
  - 若目標伺服器不可達，每隔一段時間 replicate 一次
  - 若關機或重啟，事件丟失
  - 一般還需對 replica 設置標準計畫複製



Streaming Cluster Replicator (SCR)

- 將資料庫的修改存入記憶體
  - 資料庫修改發生後，修改立即被捕捉
  - 修改存入記憶體佇列
- 直接發送修改
  - 向所有包含此副本的 cluster 伺服器發送
  - 其他伺服器收到修改，應用於 replica
- Domino 8.0 以後支持
- 性能提升
  - 時延小 **(269s -> 5s, 4000** 個用戶的測試環境 **)**
  - 源伺服器 CPU 減少 10%



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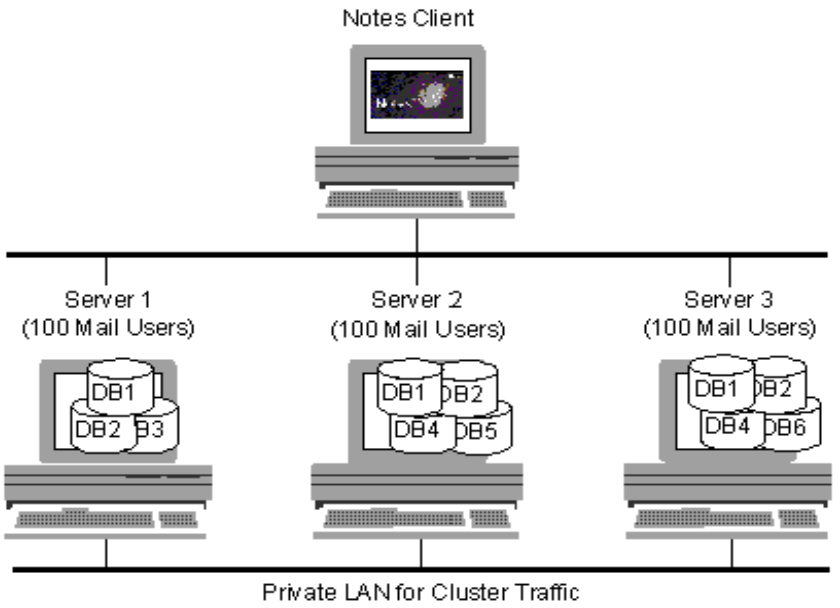
Cluster 的規劃

- 高可靠性的資料庫
  - mail 資料庫，重要資料庫，訪問量大的資料庫
- cluster 規模
  - 機器的配置
- 高速專用局域網



建立 cluster

- 創建
  - 設置
- 驗證
- 創建 replica

監控 **cluster**

- 顯示 cluster 成員和可用性
  - show cluster
- 容錯移轉和負載均衡事件
  - log.nsf
- Replication 統計
  - Show stat replica.cluster*
  - Tell clrepl dump

```
sh cluster
 Cluster information:
 Cluster name: cluster_xhp, Server name: mrwin64/851fpx
 Server cluster probe timeout: 1 minute(s)
 Server cluster probe count: 54
 Server cluster default port: *
 Server cluster auxiliary ports:
 Server availability threshold: 0
 Server availability index: 100 (state: AVAILABLE)
 Server availability default minimum transaction time: 3000
 Cluster members (2):
 Server: mraix64/851fpx, availability index: 100
 Server: mrwin64/851fpx, availability index: 100
```

```
Cluster Replicator context at 08/13/2010 02:39:17 AM
Tasks:          1
Work Queue Depth:   0
RetryInProgress:    0
RTR Pool Usage:     4% [42336 of 1048576 bytes used]
   Destination Server database block    73
    Server:         CN=mraix64/O=851fpx
    LastError:      No error
    LastRetryTime:  08/13/2010 02:36:38 AM
08/13/2010 02:39:18 AM  Dumping In-memory context
```

問與答

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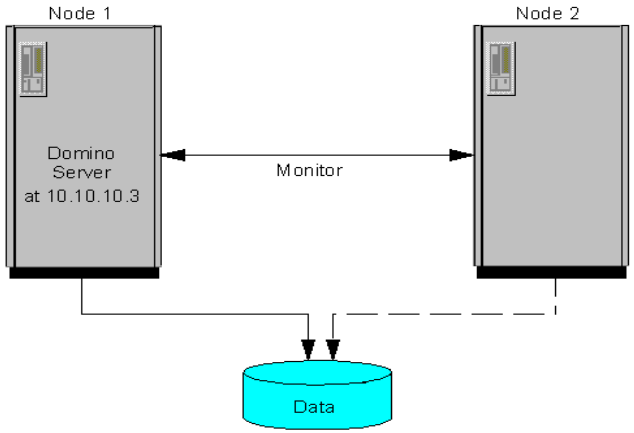
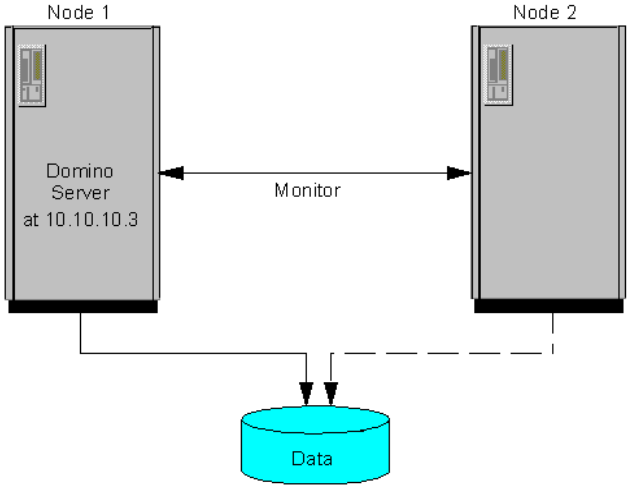
Domino Cluster VS HACMP, MSCS

- Domino Cluster 優點
  - 不同作業系統
  - 負載均衡
  - 更智能，容錯移轉至可用性最高的伺服器
  - 多份數據



- OS Cluster 優點
  - Domino 代理容錯移轉
  - Hardcode 的 Domino Application 容錯移轉
  - Administration Process 容錯移轉



群集中的郵件容錯移轉

- 使用者打開不可用的郵件資料庫時
  - 容錯移轉發生，就像打開其他非郵件資料庫
- 用戶編輯郵件時，伺服器不可用
  - 發送時容錯移轉，發送到群集那其他郵件伺服器 MAIL.BOX
- 路由郵件時，目標郵件伺服器不可用
  - 本機伺服器和目標伺服器在同一群集，且本機伺服器有郵件資料庫 replica
  - 本機伺服器和目標伺服器在同一群集，但本機伺服器沒有資料庫 replica
  - 本機伺服器和目標伺服器在同一群集，但群集中沒有可用 replica
    - 週期性向目標伺服器不斷發送
  - 本機伺服器和目標伺服器不在同一群集，發送到目標群集中的一台伺服器

loadmon.ncf

OPEN_DB = 291.8
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OPEN_NOTE = 112.125
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DB_WRITE_HIST = 3000000
GET_SPECIAL_NOTE_ID = 68.3333333333333