# Dimensionando Hardware e Storage para SQL Server

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# Agenda

- O que é IOPS
- Storage
- Network
- Processador

# Storage

- Como dimensionar o storage para performance, tipos e custo

# O que é IOPS

- Input Output Process per Second
  Indica o numero de operações que um disco pode executar por segundo

- Calcular corretamente o IOPS é essencial em um ambiente onde se deseja performance

- O total de IOPS de um storage é medido pela soma dos IOPS dos discos individuais de um storage
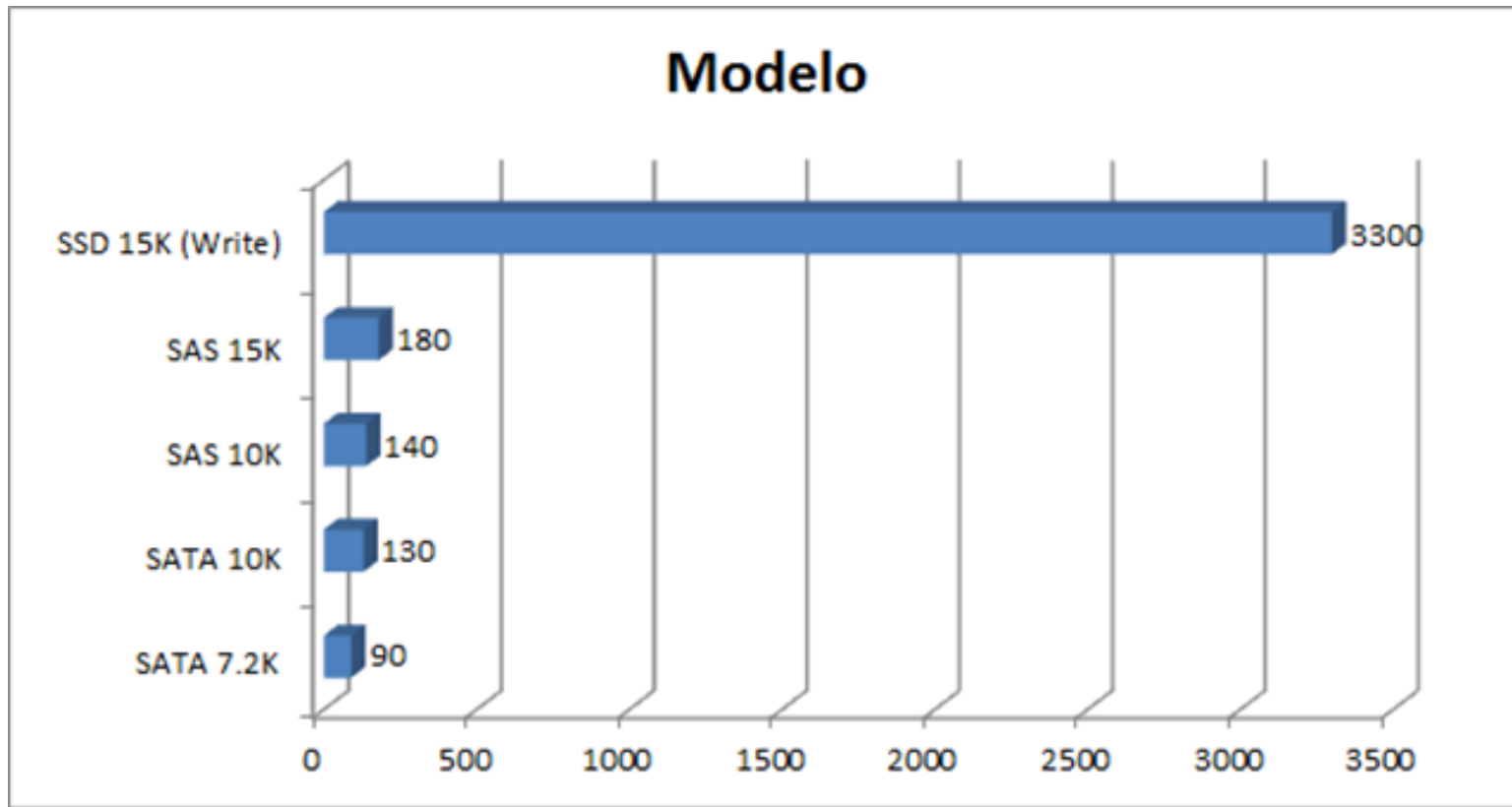
# IOPS para SharePoint 2010

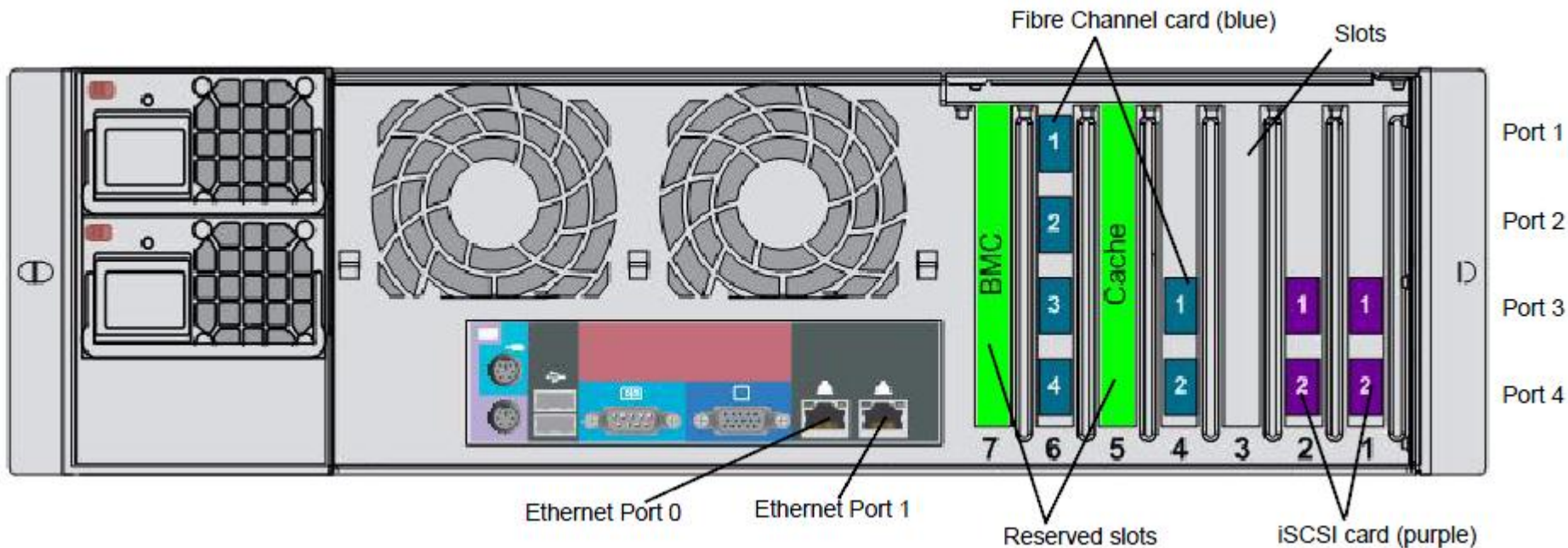| Service application | Size estimation recommendation |
|---|---|
| Search | Search requires three databases. Your environment may include multiple Property and Crawl databases. |
| | The Search administration database is typically small: allocate 10 GB. |
| | To estimate the required storage for your Property and Crawl databases, use the following multipliers: |
| | • Crawl: 0.046 × (sum of content databases) |
| | • Property: 0.015 × (sum of content databases) |
| | The IOPS requirements for Search are significant. |
| | • For the Crawl database, search requires from 3,500 to 7,000 IOPS. |
| | • For the Property database, search requires 2,000 IOPS. |

# IOPS para Visio Services

| Service Application | Web server CPU | Web server RAM | Application server CPU | Application server RAM | SQL Server CPU | SQL Server IOPS | SQL Server storage |
|---|---|---|---|---|---|---|---|
| SharePoint Foundation Service | XXX | XXX | | | XX | XXX | XXX |

| | DELL PE 2950 | DELL PE 2950 | DELL PE R900 |
|---|---|---|---|
| Role | WFE | Application server | SQL Server-based server |
| Processor (CPU) | 2pX4 (Xeon L5420@2.5GHz) | 2pX4 (Xeon L5420@2.5GHz) | 4pX4 (Xeon E7330@2.4GHz) |
| RAM in gigabytes (GB) | 16 | 16 | 32 |
| Operating system | Windows Server 2008 R2 Enterprise | Windows Server 2008 R2 Enterprise | Windows Server 2008 R2 Datacenter |
| Authentication | NTLM | NTLM | NTLM |
| Storage: Operating System | 4x 146 GB, 10 K RPM, RAID 0 | 4x 146 GB, 10 K RPM, RAID 0 | 2x 146 GB, 15 K RPM, RAID 1 |
| Storage: Backups | -- | -- | 3x 300 GB, 15 K RPM, RAID 5 |
| Storage: SQL Server data | -- | -- | 9x 300 GB, 15 K RPM, RAID 5 |
| Storage: SQL Server logs | -- | -- | 6x 300 GB, 15 K RPM, RAID 5 |
| Number of instances of SQL Server | 0 | 0 | 1, SQL Server 2008 SP1 CU6 |

| Business Connection Service * | XX | XX | XXX | XXX | | | |
| InfoPath Forms Service | XX | XX | XX | XX | X | X | X |

# Tipos de Discos e IOPS



**Modelo**

| Disco | IOPS |
|-------|------|
| SSD 15K (Write) | 3300 |
| SAS 15K | 180 |
| SAS 10K | 140 |
| SATA 10K | 130 |
| SATA 7.2K | 90 |

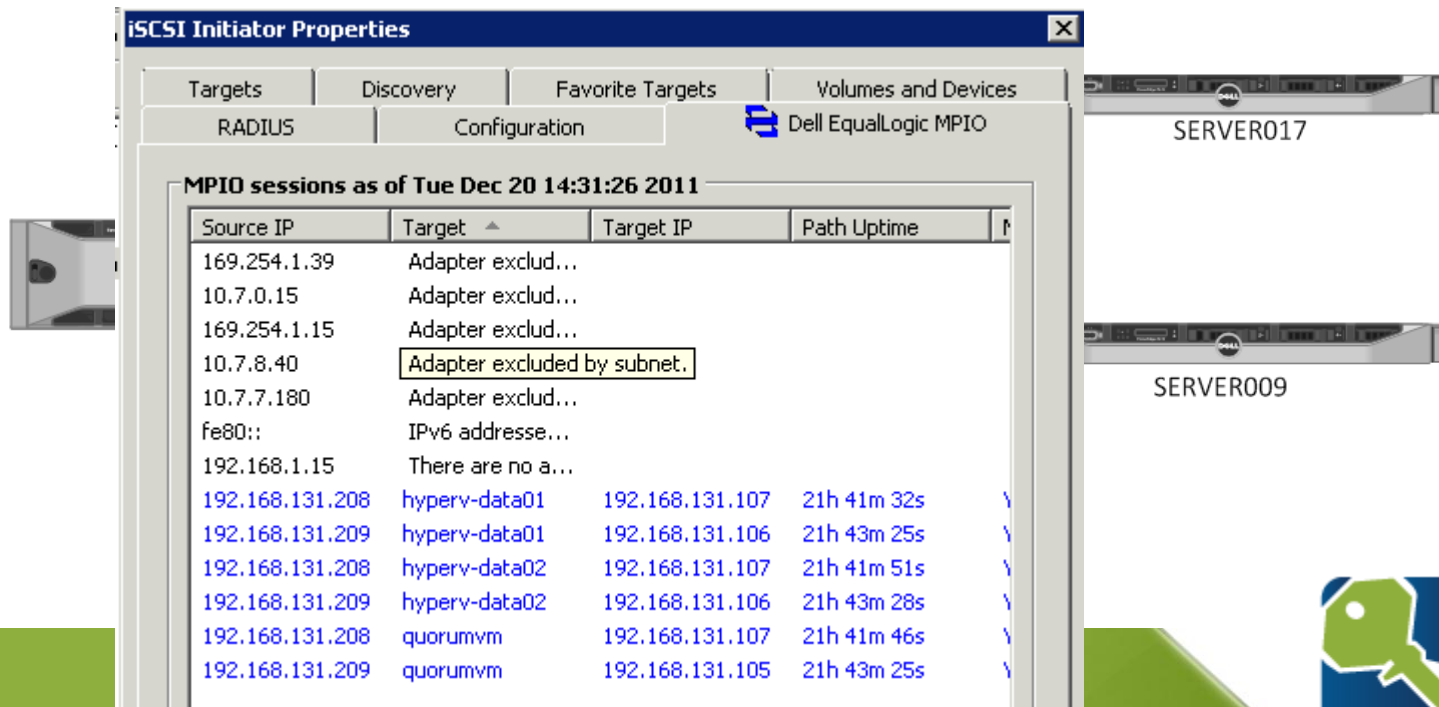# RAID Storage

- RAID Storage é uma CPU?

# Multi Path

- Diversas placas acessando o storage, redundância e performance

# Configurações de Storage

- JBOD
- RAID Storage
- RAID 0
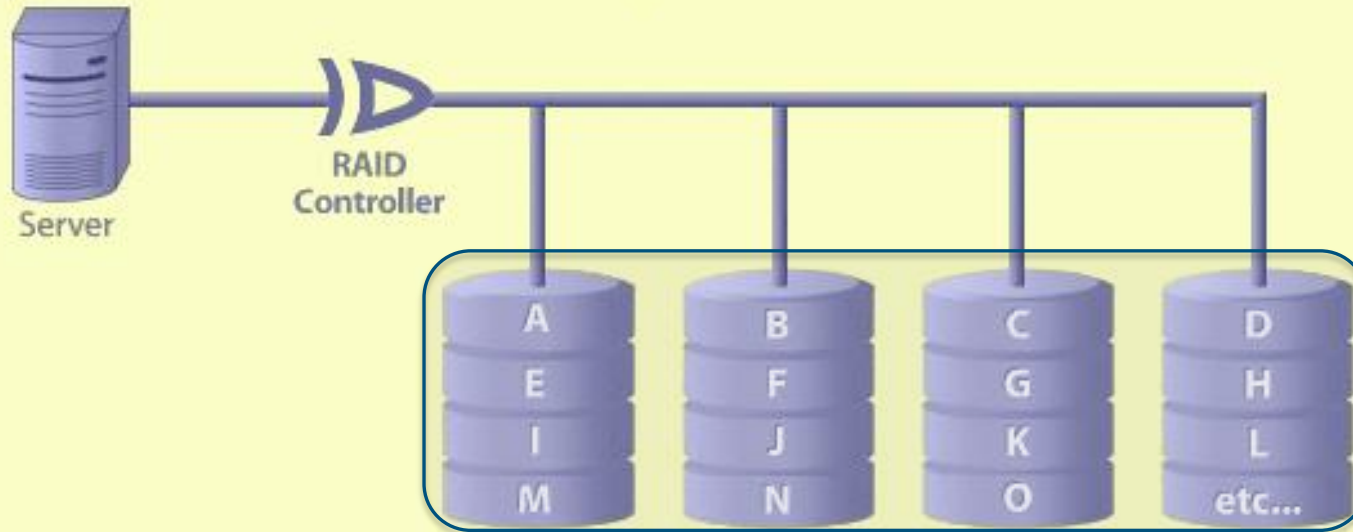- RAID 1
- RAID 5 e 50
- RAID 6
- RAID 10

# JBOD

*"Common type of disk storage where multiple disks are attached to a common motherboard (backplane) and appear as individual attached devices to the network (SAN)".*
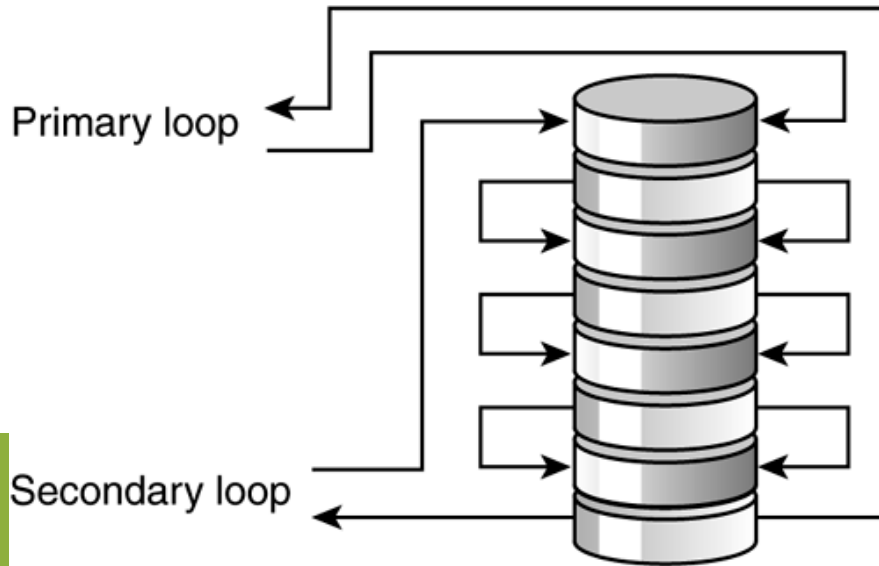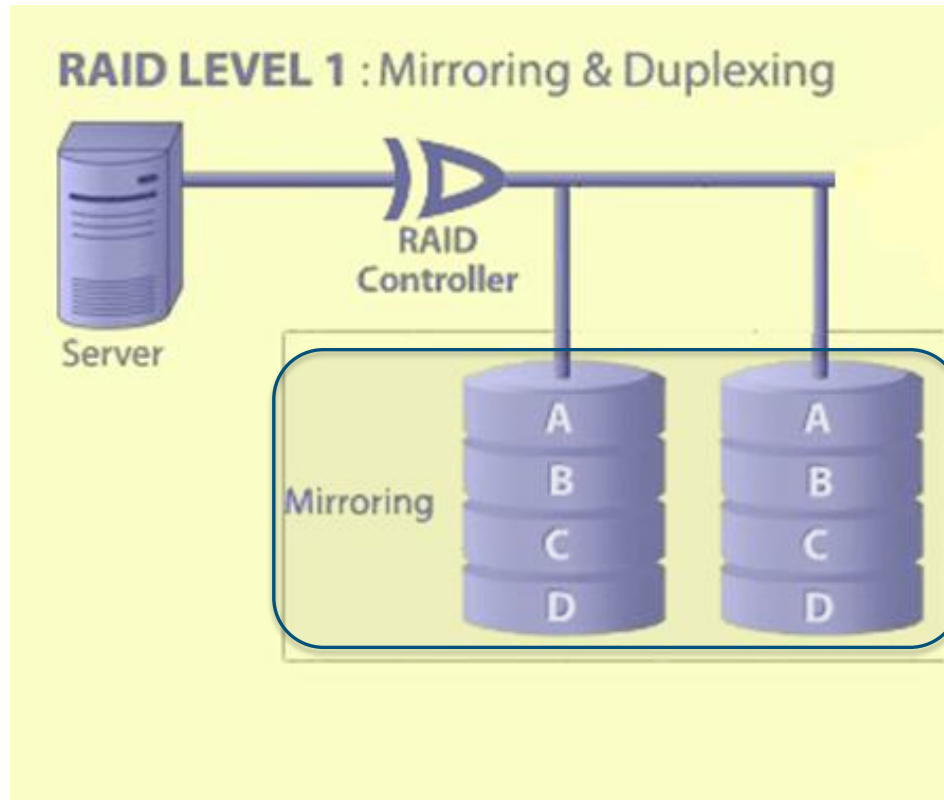
# RAID 0



RAID LEVEL 0 : Striped Disk Array without Fault Tolerance

- RAID 0 requer mínimo de 2 discos
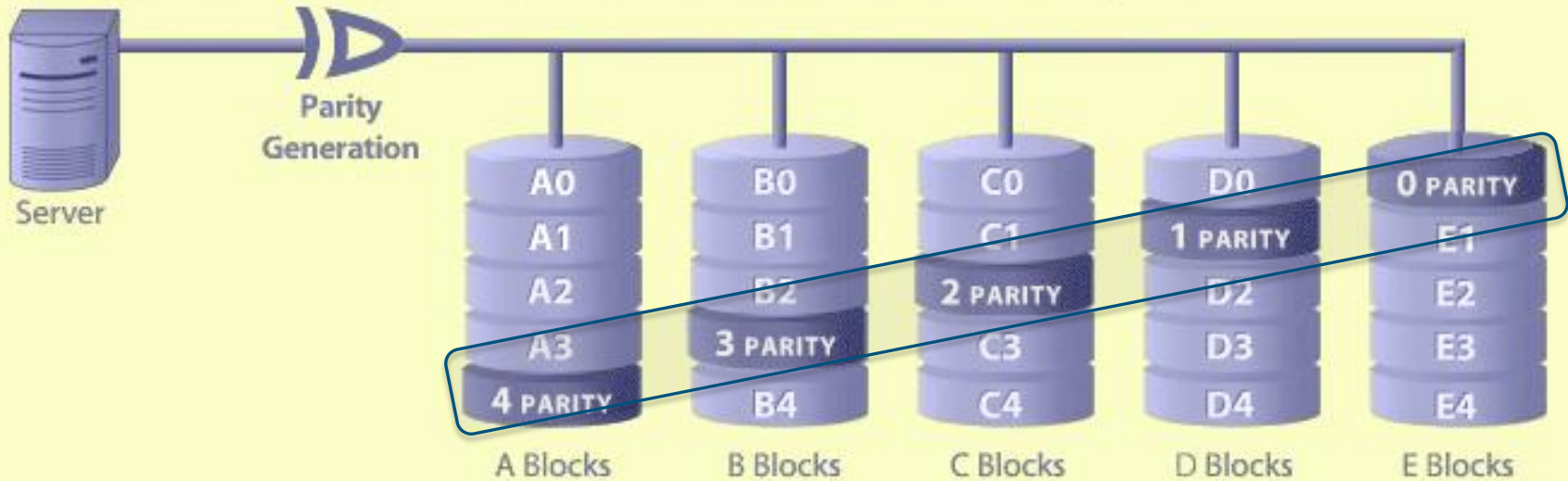- Não tem redundância, mas boa performance e utilização de espaço

# RAID 1



- RAID 1 requer mínimo de 2 discos e trabalha em pares
- Ótima redundância e performance mas péssima utilização de espaço
- Recomenda-se utilizar controladoras separadas quanto sem enclosures

# RAID 5



**RAID LEVEL 5 :** Independent Data Disks with Distributed Parity Blocks

| A Blocks | B Blocks | C Blocks | D Blocks | E Blocks |
|----------|----------|----------|----------|----------|
| A0 | B0 | C0 | D0 | 0 PARITY |
| A1 | B1 | C1 | 1 PARITY | E1 |
| A2 | B2 | 2 PARITY | D2 | E2 |
| A3 | 3 PARITY | C3 | D3 | E3 |
| 4 PARITY | B4 | C4 | D4 | E4 |

- RAID 5 requer mínimo de 3 discos, um para paridade
- Boa redundância, performance e utilização do espaço
- RAID 50 duplica a paridade em um disco (spare), exigindo 4 discos minimo, aumentando a redundância
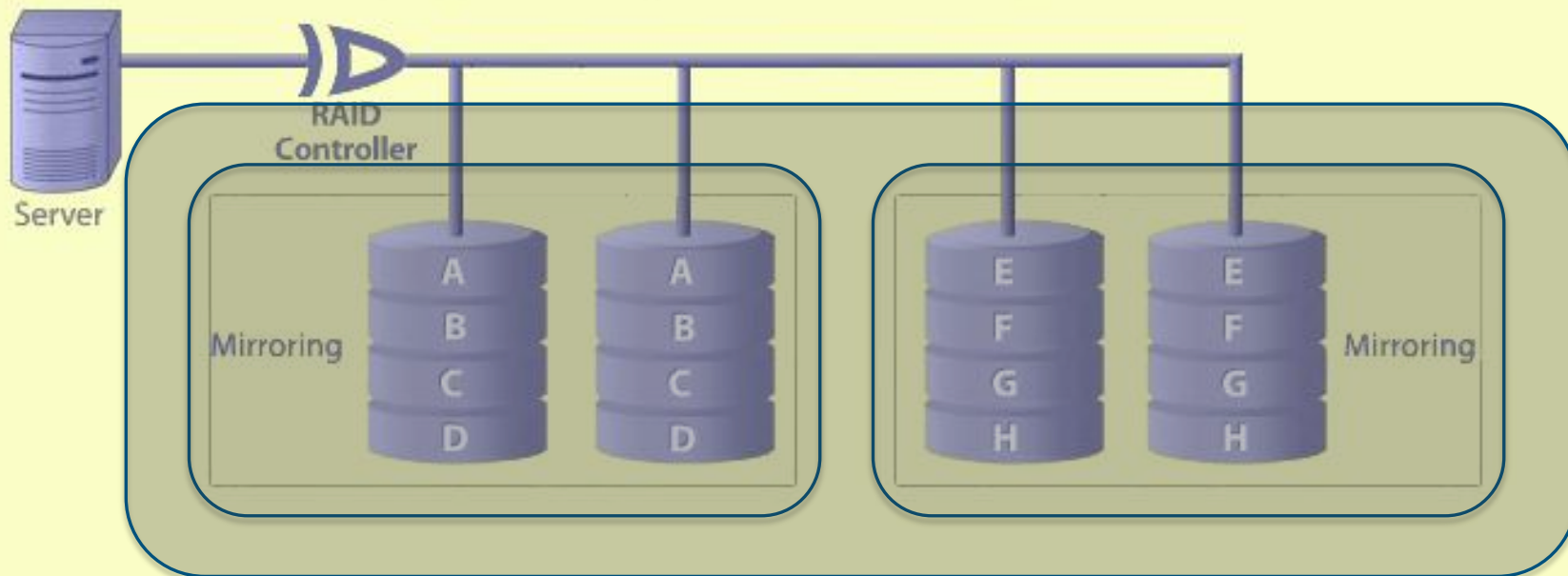
# RAID 6



RAID LEVEL 6 : Independent Data Disks with Two Independent Distributed Parity Schemes
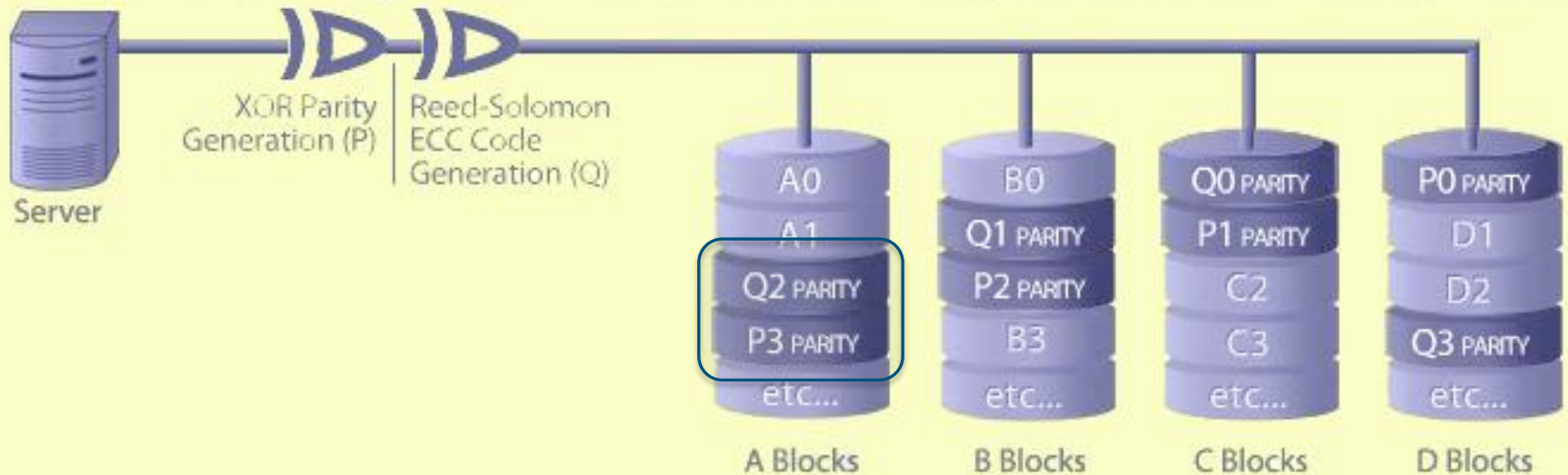
- RAID 6 requer mínimo de 4 discos, dois para paridade
- Ótima redundância, boa performance e utilização do espaço ideal para muitas cabeças
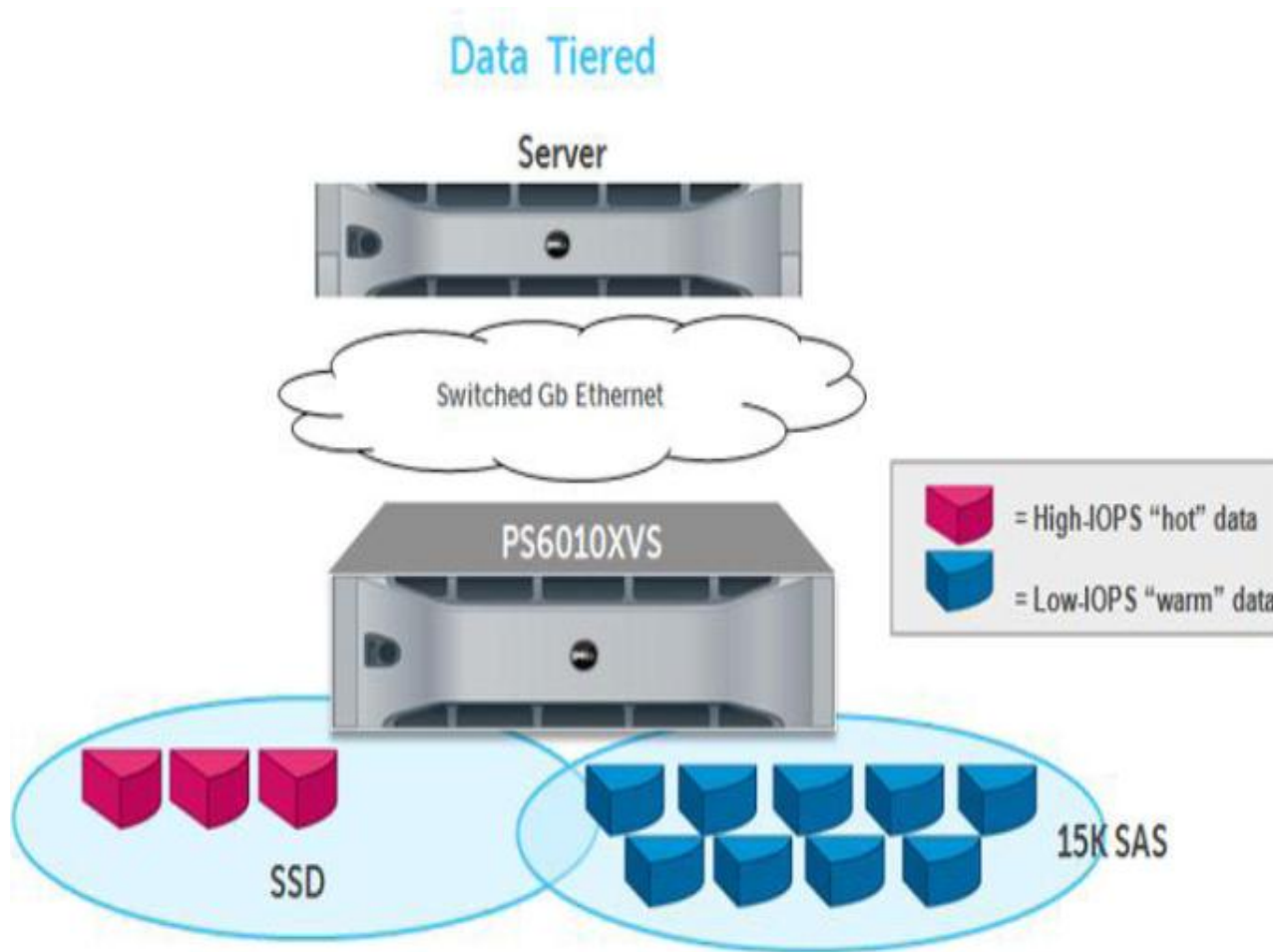
# RAID 10



RAID LEVEL 10 : Very High Reliability Combined with High Performance

- RAID 10 requer mínimo de 4 discos
- Ótima redundância e performance, péssima utilização do espaço
- É utilizado com controladoras separadas
- Melhor que RAID 0+1

# Hybrid Arrays (or Enclosures)

- **AUTOMATED WORKLOAD TIERING**

# IOPS do SQL Server com SAP

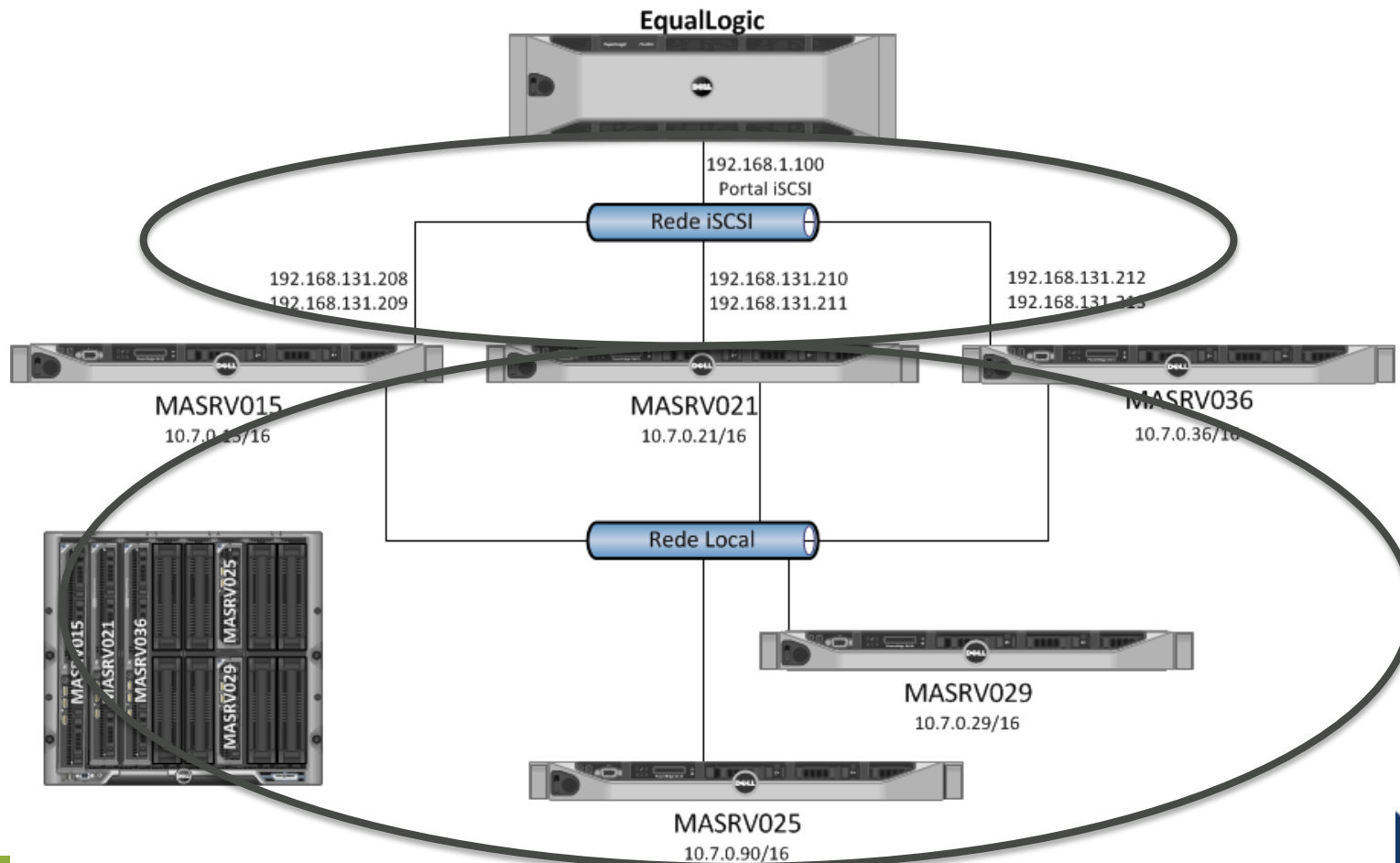| I/O type | Average IOPs | Sustained maximum IOPs | Peak IOPs | Sustained maximum MB/s | Peak MB/s | Average I/O size |
|---|---|---|---|---|---|---|
| Data file reads | 2,500 (over a 24-hour period) 4,500 (during busy times) | 10,000 | 15,000 | 400 MB/s | 440 MB/s | 20K |
| Data file writes | Less than 200 | 1,000 | 1,900 | 70 MB/s | 85 MB/s | 25K |
| Log file writes | Less than 200 | 200 | 200 | 40 MB/s | 16 MB/s | 16K (60K maximum) |

| Disks | Number of disks | RAID level | Total logical I/Os (as measured via perfmon) | Total physical I/O (RAID adjusted) | I/Os per device |
|---|---|---|---|---|---|
| SSD | 4 | 5 | 12,044 | 17,876 | 4,469 |
| Traditional 15K Fibre Channel drives | 34 | 1+0 | 12,362 | 14,465 | 425 |

# Network

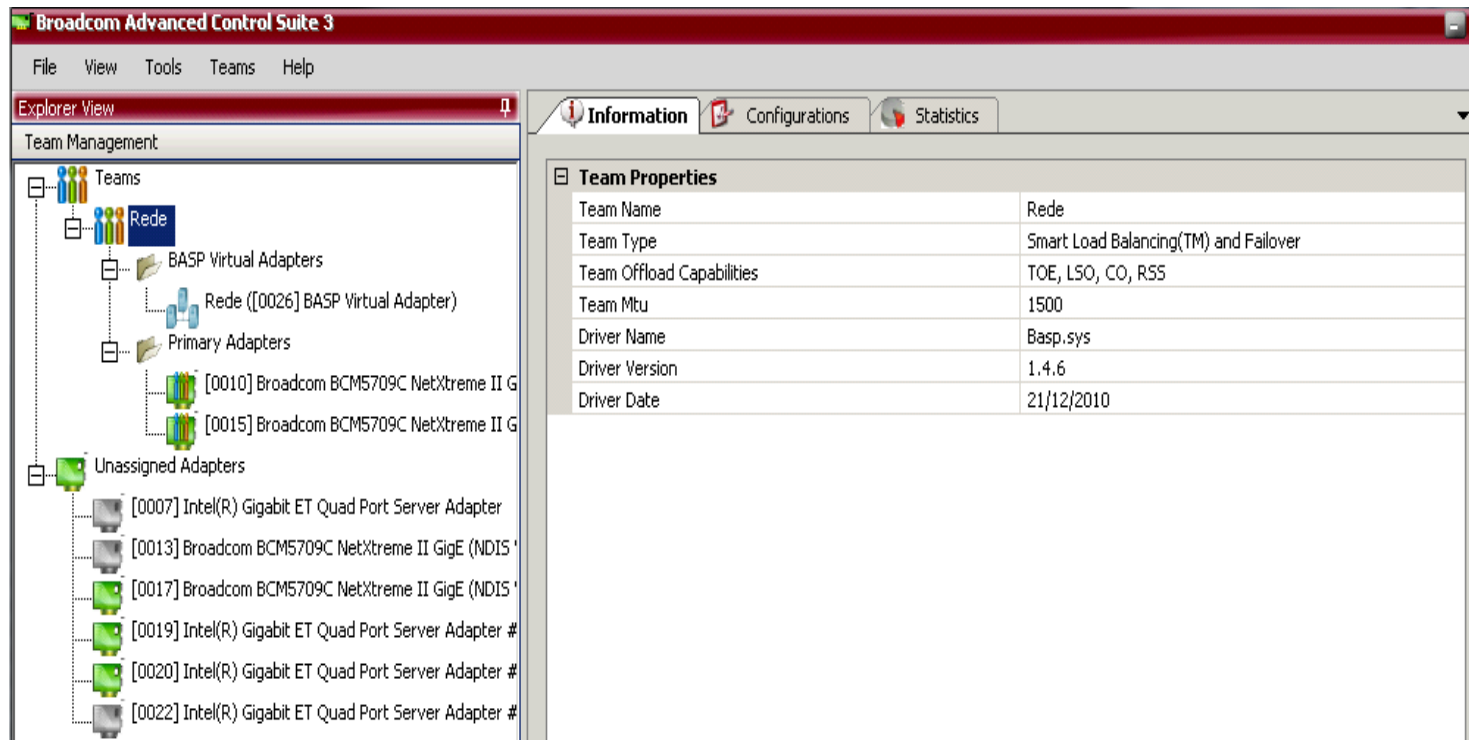- Como utilizar os recursos do hardware de forma a ter a melhor performance da rede do cliente

# Redes Físicas Segregadas



Diagrama de Rede dos Servidores

# NIC Team

- Multiplos adaptadores acessando a mesma rede

# Processador

- Qual o melhor tipo e configuração de processamento para ambientes de banco de dados

# Processador por Versão

| SQL Server Edition | Maximum Compute Capacity Used by a Single Instance (SQL Server Database Engine) | Maximum Compute Capacity Used by a Single Instance (AS, RS) |
| --- | --- | --- |
| Enterprise Edition: Core-based Licensing[1] | Operating system maximum | Operating system maximum |
| Developer | Operating system maximum | Operating system maximum |
| Evaluation | Operating system maximum | Operating system maximum |
| Business Intelligence | Limited to lesser of 4 Sockets or 16 cores | Operating system maximum |
| Standard | Limited to lesser of 4 Sockets or 16 cores | Limited to lesser of 4 Sockets or 16 cores |
| Web | Limited to lesser of 4 Sockets or 16 cores | Limited to lesser of 4 Sockets or 16 cores |
| Express | Limited to lesser of 1 Socket or 4 cores | Limited to lesser of 1 Socket or 4 cores |
| Express with Tools | Limited to lesser of 1 Socket or 4 cores | Limited to lesser of 1 Socket or 4 cores |
| Express with Advanced Services | Limited to lesser of 1 Socket or 4 cores | Limited to lesser of 1 Socket or 4 cores |

# Configuração de Cores/Sockets

- ■ **Servidores Fisicos**
  - ■ Utilizar HyperThreading e respeitar os limites da versão do SQL Server
- ■ **Servidores Virtuais**
  - ■ Não utilizar HyperTheading, pois o Hypervisor apresenta VPs
- ■ Configure corretamente o "Max Degree Paralellism"

# Patrocinadores