

Media Storage Needs – in a technical & economical Life Cycle perspective

“(Rich) Media” Storage = Storage tuned for writing & reading of streaming audio and video + file transfers of large media files + corresponding meta data services

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Media Storage Needs – in a technical & economical Life Cycle perspective

Quote:

“Leaders need to know their business.

They don't necessarily need to know how everything is done – but they need to know how it works”

Steve Wozniak, april 2011

(Co-founder Apple)

Media Storage Needs – in a technical & economical Life Cycle perspective

Statement:

“The biggest costs, when media data volumes increase from TB to PB, are not for the specific storage hardware required to store another TB or PB of data – but for the necessary requirements and management that are needed to guarantee access, performance and integrity of the data, and future scalability & migration.”

Media Storage Needs – in a technical & economical Life Cycle perspective

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Media Storage Needs – in a technical & economical Life Cycle perspective

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Media Storage Needs – in a technical & economical Life Cycle perspective

When **you** talk about **Storage Costs** – what do you usually mean?

The cost to **buy** the specific Storage?

Or including costs for **Management** (time & tools), **Access** (solutions & services), shifting **Performance** demands, secured **Integrity**, future **Scalability** and means for **Migration**?

Media Storage Needs – in a technical & economical Life Cycle perspective

Storage

Cost for GB – TB – PB storage

Management

€/GB

Access

Performance

Integrity

Scalability

Migration

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Media Storage Needs – in a technical & economical Life Cycle perspective

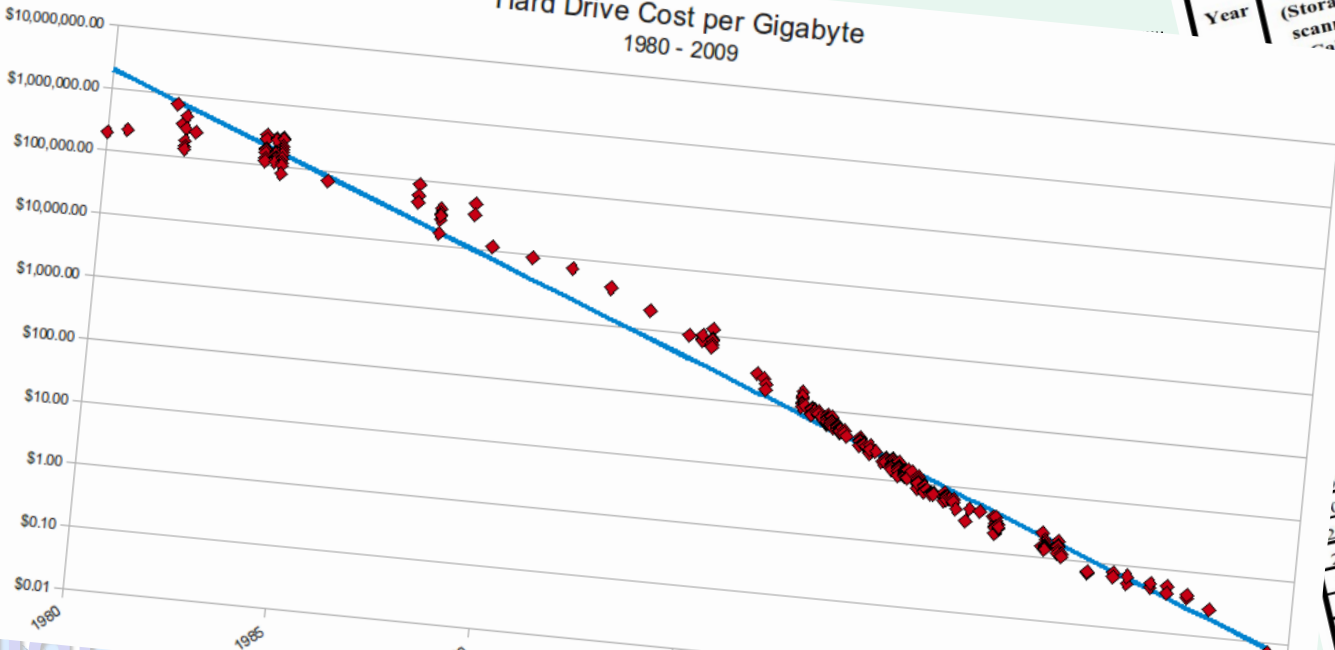
Storage

Cost for GB – TB – PB storage

€/GB

Cost For 1 TeraByte = 1,000 GigaBytes (

Hard Drive Cost per Gigabyte
1980 - 2009



2006						
2007	0.13	127.15				
2008	0.07	70.11	140.23			
2009	0.04	38.56	77.13	154.25	308.50	
2010	0.02	21.21	42.42	84.84	169.68	

Projected Magnetic Disk Prices

Year	Cost for 1 GigaByte = 1,000 MBytes (Storage for 2 scanned File Cabinets)	Cost for 1 TeraByte = 1,000 GBytes (Storage for 2,000 scanned File Cabinets)
2000	100.00	1,000,000.00
2001	550.00	550,000.00
2002	302.50	302,500.00
2003	166.38	166,375.00
2004	91.51	91,506.25
2005	50.33	50,328.44
2006	27.68	27,680.64
2007	15.22	15,224.35
2008	8.37	8,373.39
2009	4.61	4,605.37
2010	2.53	2,532.95
2011	1.39	1,393.12
2012	0.77	766.22
2013	0.42	421.42
2014	0.23	231.78
2015	0.13	127.48
2016	0.07	70.11
2017	0.04	38.56
2018	0.02	21.21
2019	0.01	11.67
2020	0.01	6.42
2021	0.00	3.53
2022	0.00	1.94
2023	0.00	1.07
2024	0.00	0.59
2025	0.00	0.32
2026	0.00	0.18
2027	0.00	0.10
2028	0.00	0.05
2029	0.00	0.03
2030	0.00	0.02
2031	0.00	0.01

Media Storage Needs – in a technical & economical Life Cycle perspective

Storage

Cost for GB – TB – PB storage

Management

€/GB

Access

€/GB/Year

Performance

+ Kwh/GB/Year (power & cooling)

Integrity

+ TB/m² (floor space) or TB/rack

Scalability

= more true €/GB/Year (for HW)

Migration

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Media Storage Needs – in a technical & economical Life Cycle perspective

Management Time, resources and tools for necessary management tasks:

Access

Performance

Integrity

Scalability

Migration

Storage – installation, configuration, capacity provisioning etc.

Storage networks

Storage services

Health checks, Planning etc.

€/Managed GB/Year

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Media Storage Needs – in a technical & economical Life Cycle perspective

Access

Where, when and how?

Performance

Block access – FC, iSCSI, FCoE...

Integrity

File access – Disk file systems,
Network file systems, other protocols

Scalability

**€/Access service (including
necessary infrastructure costs)**

Migration

Uptime/Downtime – HA Services

€/Uptime/Year vs €/Downtime/Year

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Media Storage Needs – in a technical & economical Life Cycle perspective

Performance Know your workloads – find what performance you really need

Integrity

Scalability

Migration

Large File transfer – MB/s (seq I/O)

Database/small files – Random I/O

Streaming media – close to real time requirements, sustained throughput through the whole infrastructure

€/MB/s vs €/I/O vs €/Audio/Video-stream

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Media Storage Needs – in a technical & economical Life Cycle perspective

Integrity **How to preserve data integrity**

Scalability Backup & Recovery – B&R-window, Retention time, RTO, RPO etc.

Migration Long Term/Archive – Checksums, multiple copies, Object storage etc.
CDP, DR, Multi site replication...

€/GB-Backup/Year

€/GB-extra copies/Year

€/Replicated-GB/Year

Media Storage Needs – in a technical & economical Life Cycle perspective

Scalability Prepare for the future

Migration Scale up/down Volumes and Storage capacity

Scaling Performance – Architecture,
Add HW, Reconfiguration, Tiering

New and/or different workloads &
Access patterns

Scale up% – ‘Capacity’

Media Storage Needs – in a technical & economical Life Cycle perspective

Migration Prepare for the future

Migrate to new Storage Solutions –
Migration and/or replication services

Conversion between formats/protocols

Migration of metadata – directory
services, file metadata, databases etc.

€/Migrated GB

Media Storage Needs – in a technical & economical Life Cycle perspective

When you talk about **Storage Costs** – what do you really mean?

€/GB/Year €/I/O €/MB/s €/Backup/Year

€/Managed GB/Year €/Uptime/Year €/Migrated GB

€/Downtime/Year €/GB-extra copies/Year

€/Replicated-GB/Year €/Scale up%

€/Audio/Video-stream €/???

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Media Storage Needs – in a technical & economical Life Cycle perspective

When you talk about **Storage Costs** – what do you really mean?

How do You know what You need **when**, **where** and **why**?

Analyze **Your** work flow and requirements

Media Storage Needs – in a technical & economical Life Cycle perspective

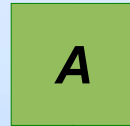


**Generic Radio Broadcaster
(simplified example)**

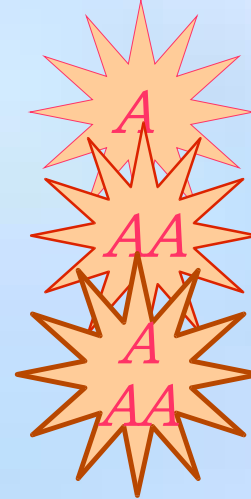
Media Storage Needs – in a technical & economical Life Cycle perspective



Storage
Size < 1 TB

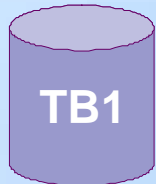


Long Term
Storage & Archive



“Access &
Availability
Level”

A = Business
Hours
AA = 24/7
AAA = 100%



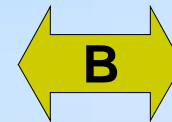
Storage
Size < 10 TB



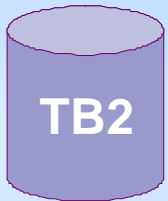
Streaming R/W



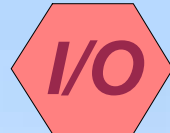
File Transfer/
Copy R/W



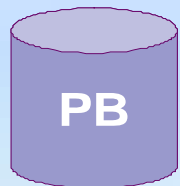
Conventional
Backup &
Restore



Storage
Size > 10 TB



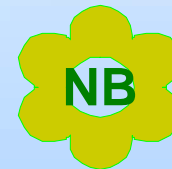
Random I/O



Storage
Size PB



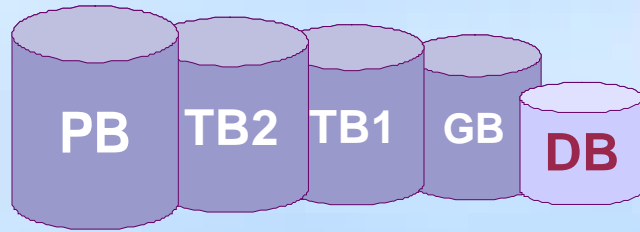
Storage
Size GB



“Backup
Free” Solution

Generic Storage & service
classes (simplified examples)

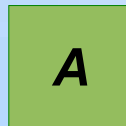
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“Storage Classes”



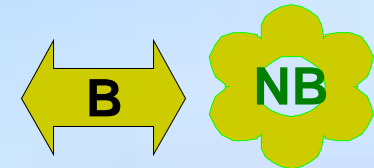
“Access & Availability Classes”



“Endurance Classes”



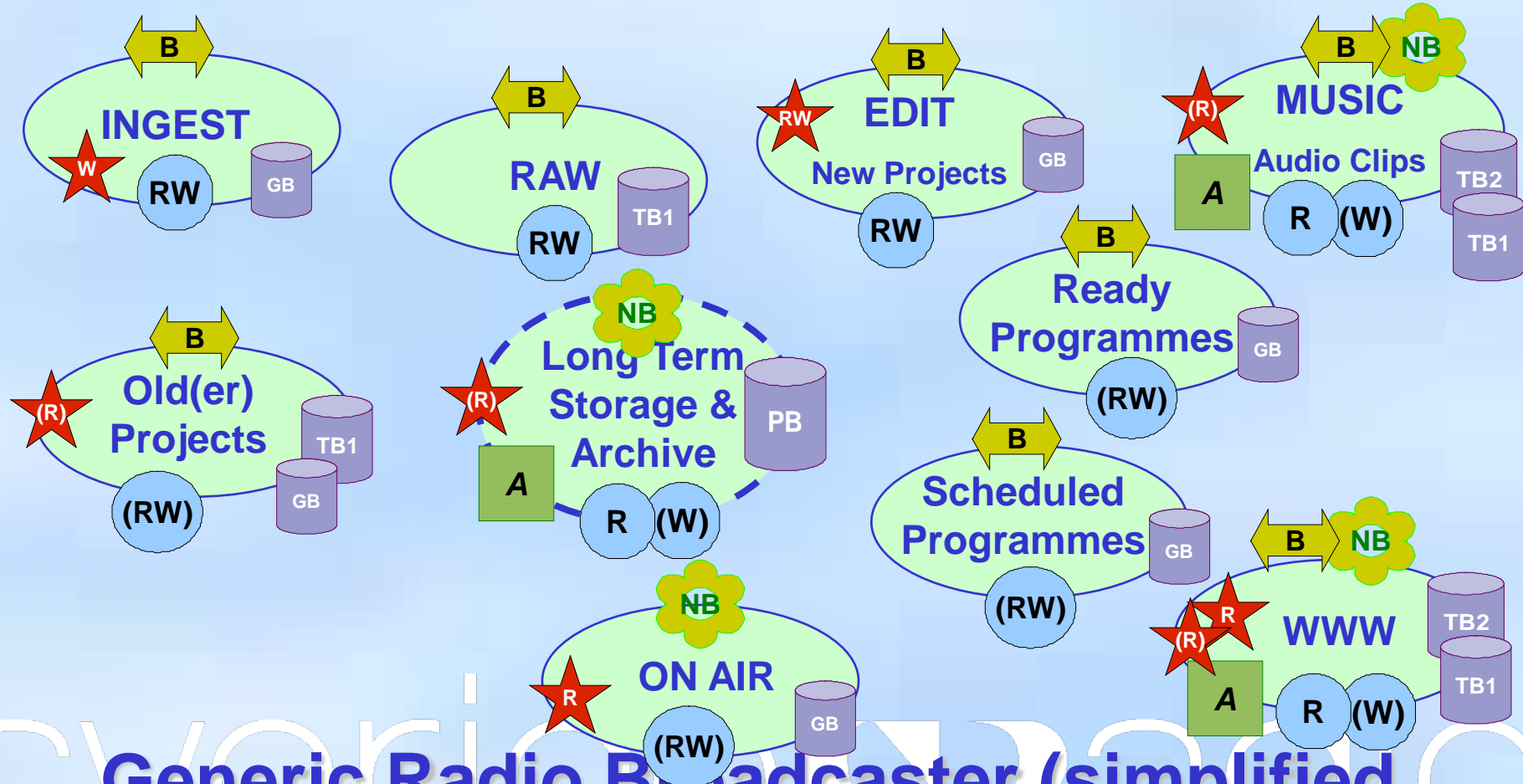
“Performance Classes”



“Backup & Restore Classes”

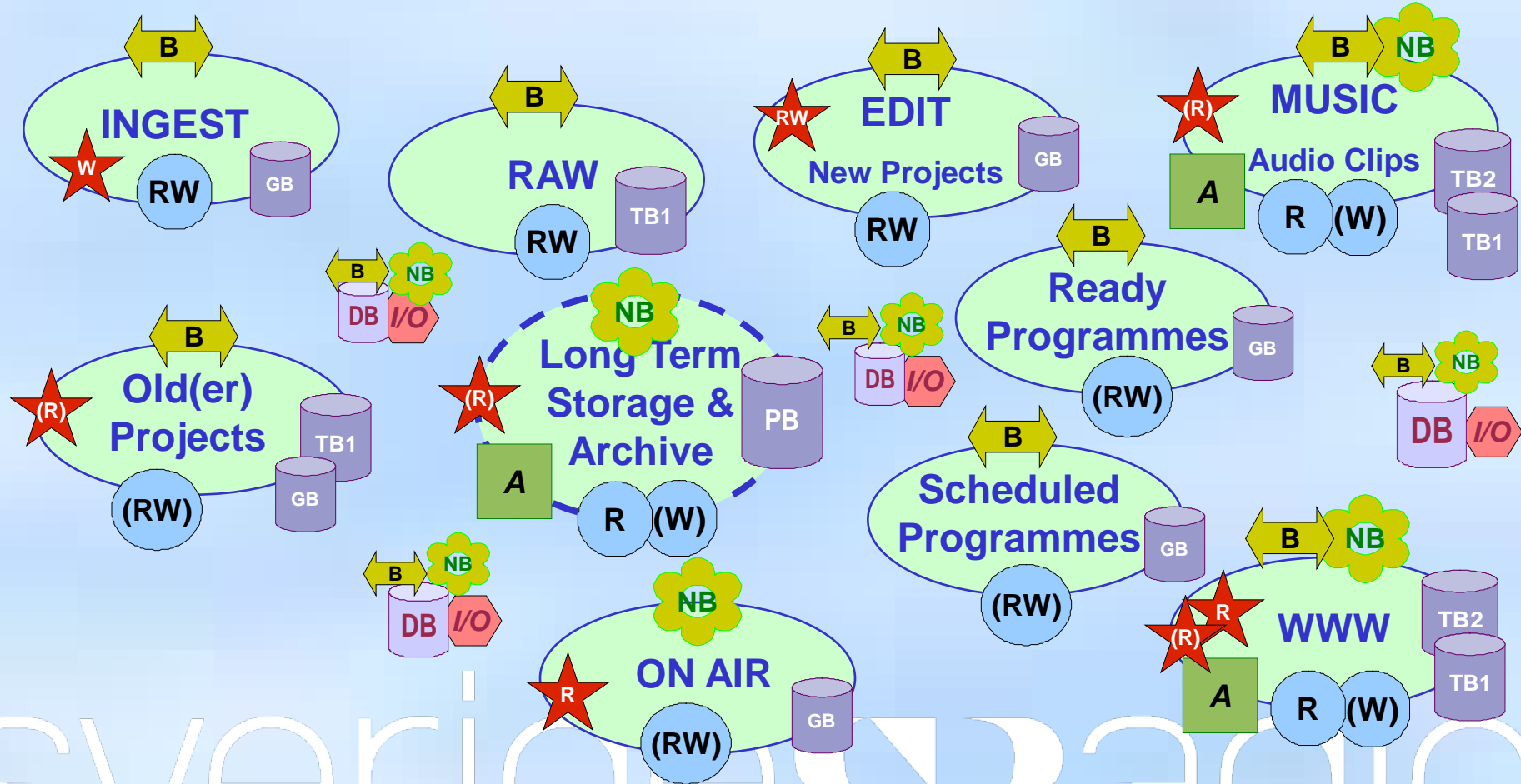
**Generic Storage & service
classes (simplified examples)**

Media Storage Needs – in a technical & economical Life Cycle perspective

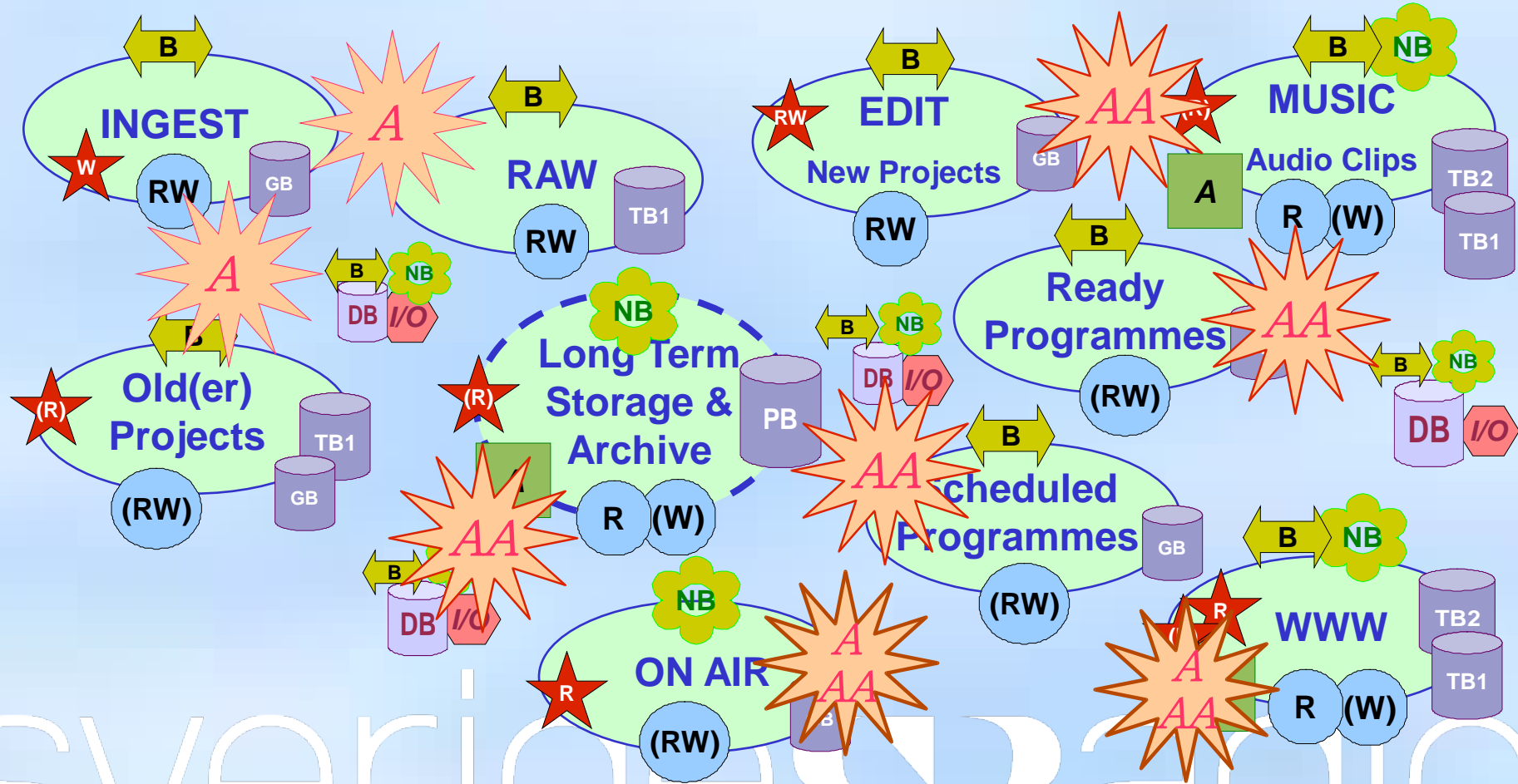


Generic Radio Broadcaster (simplified example)

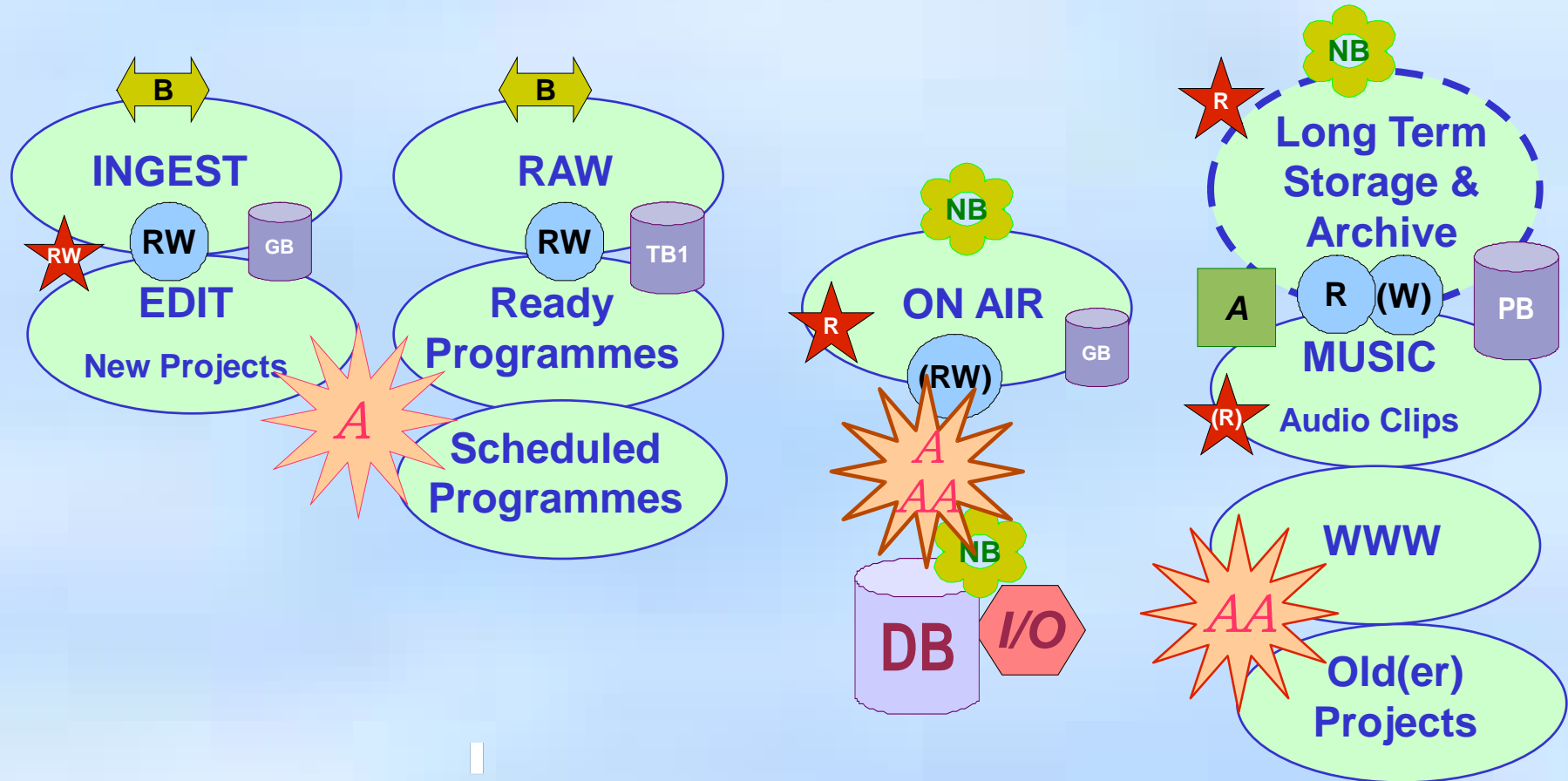
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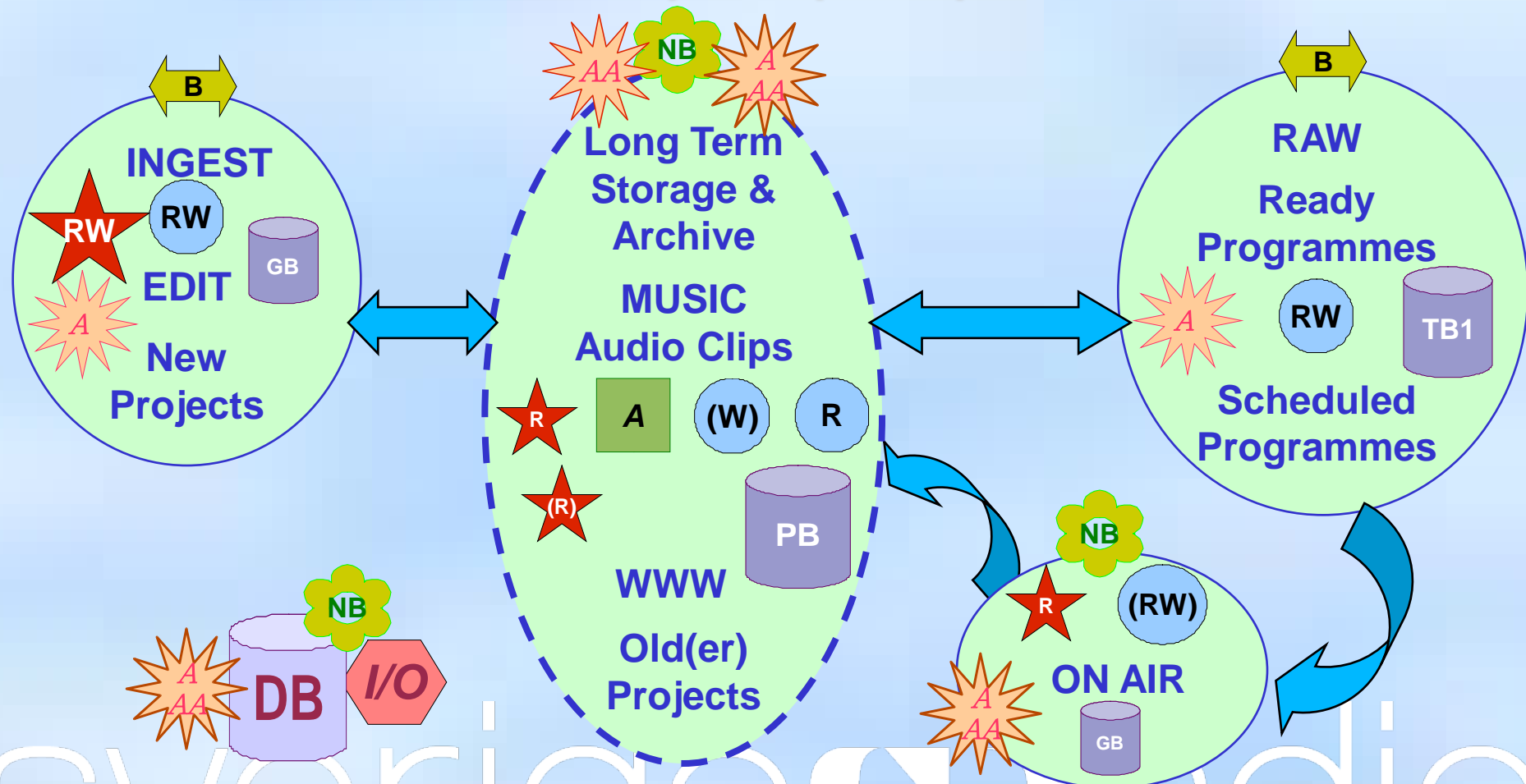
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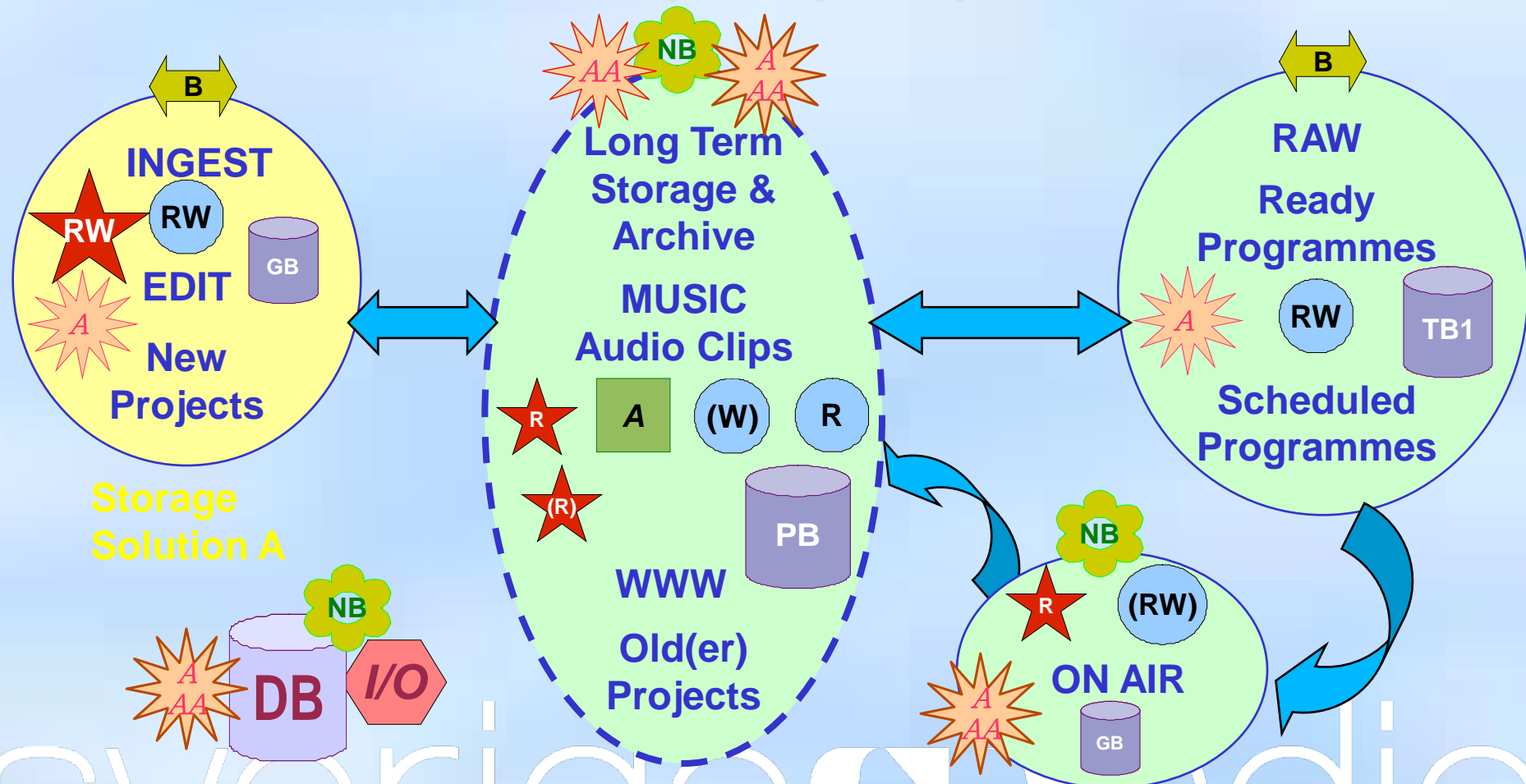
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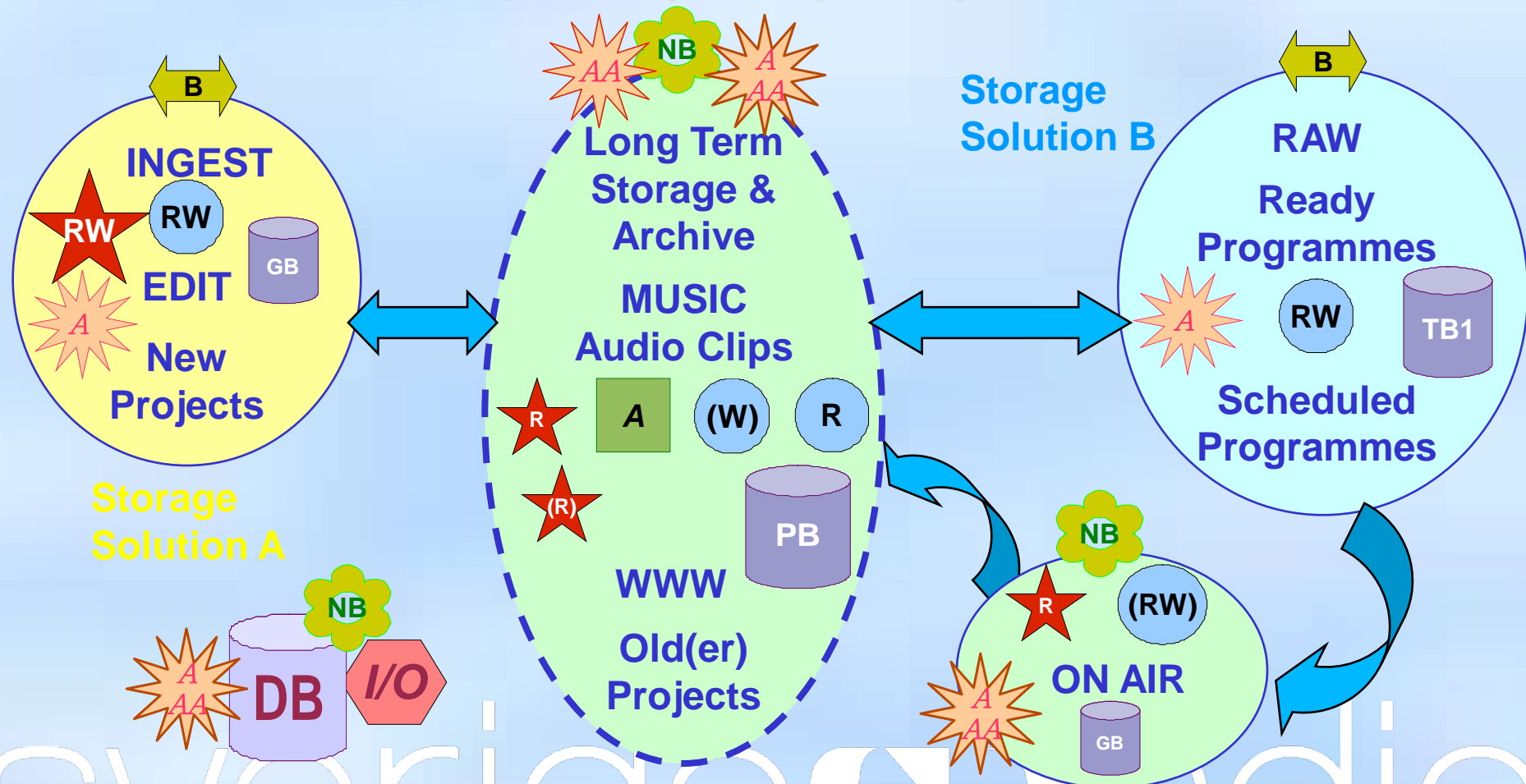
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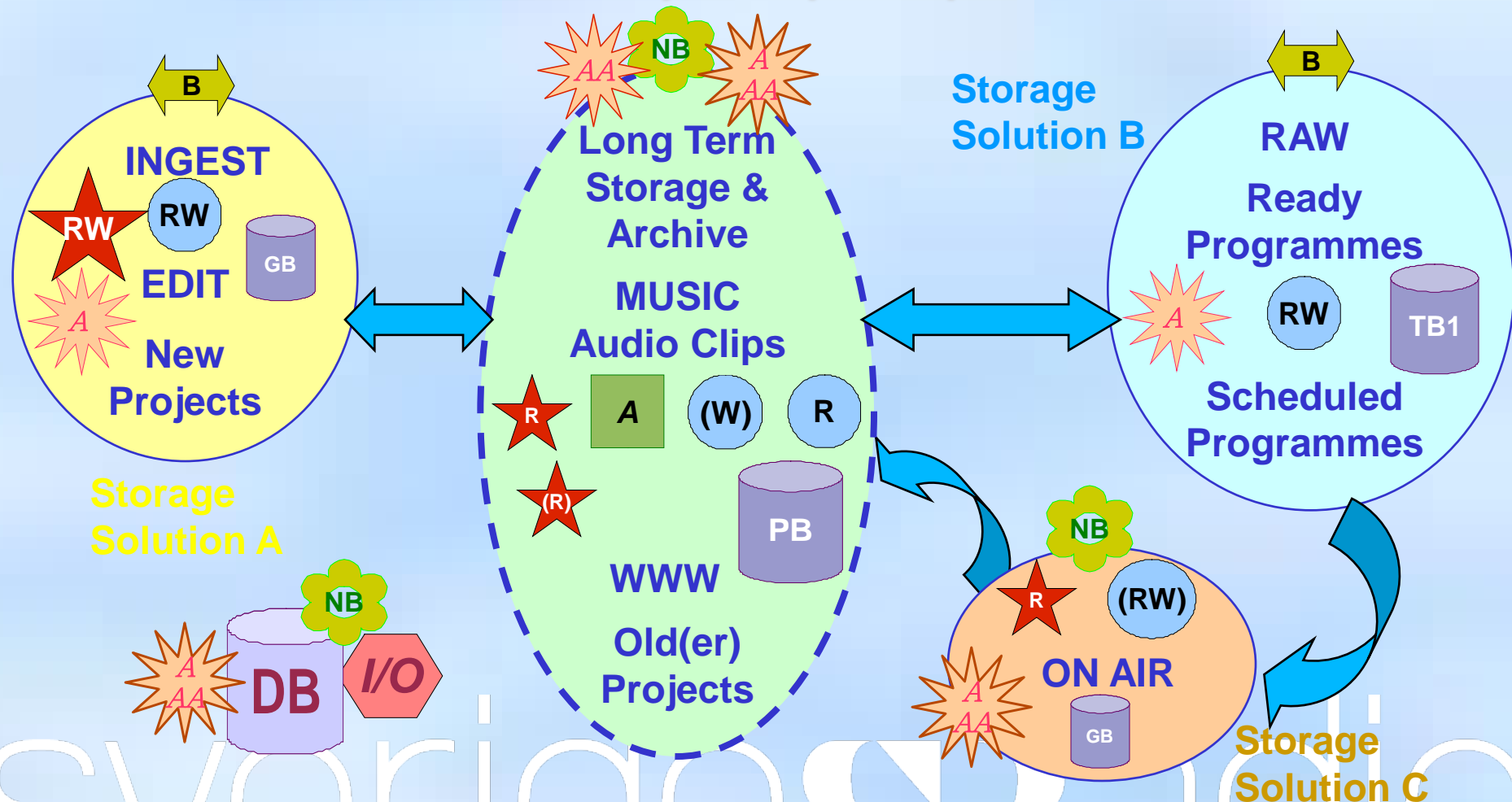
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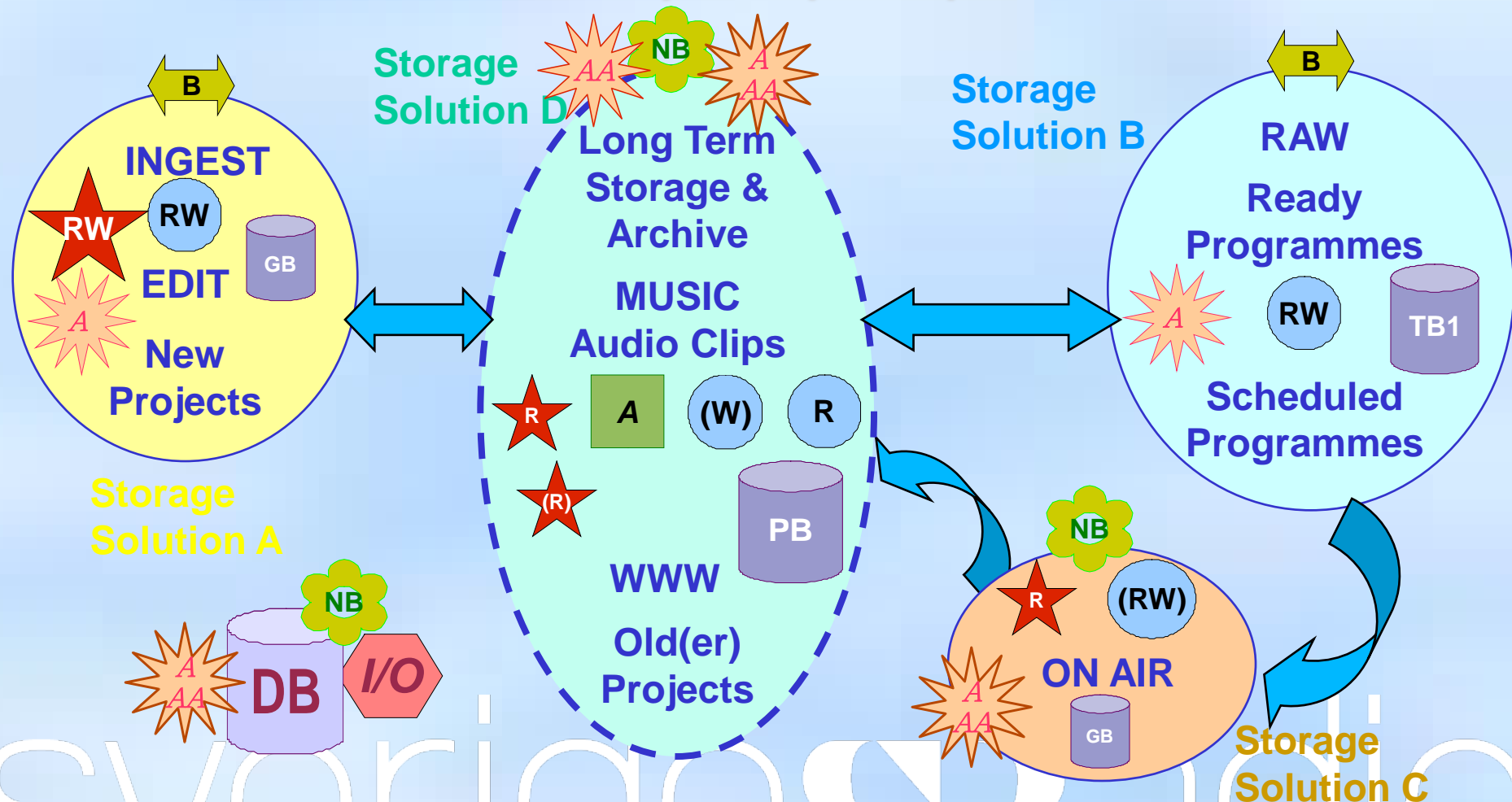
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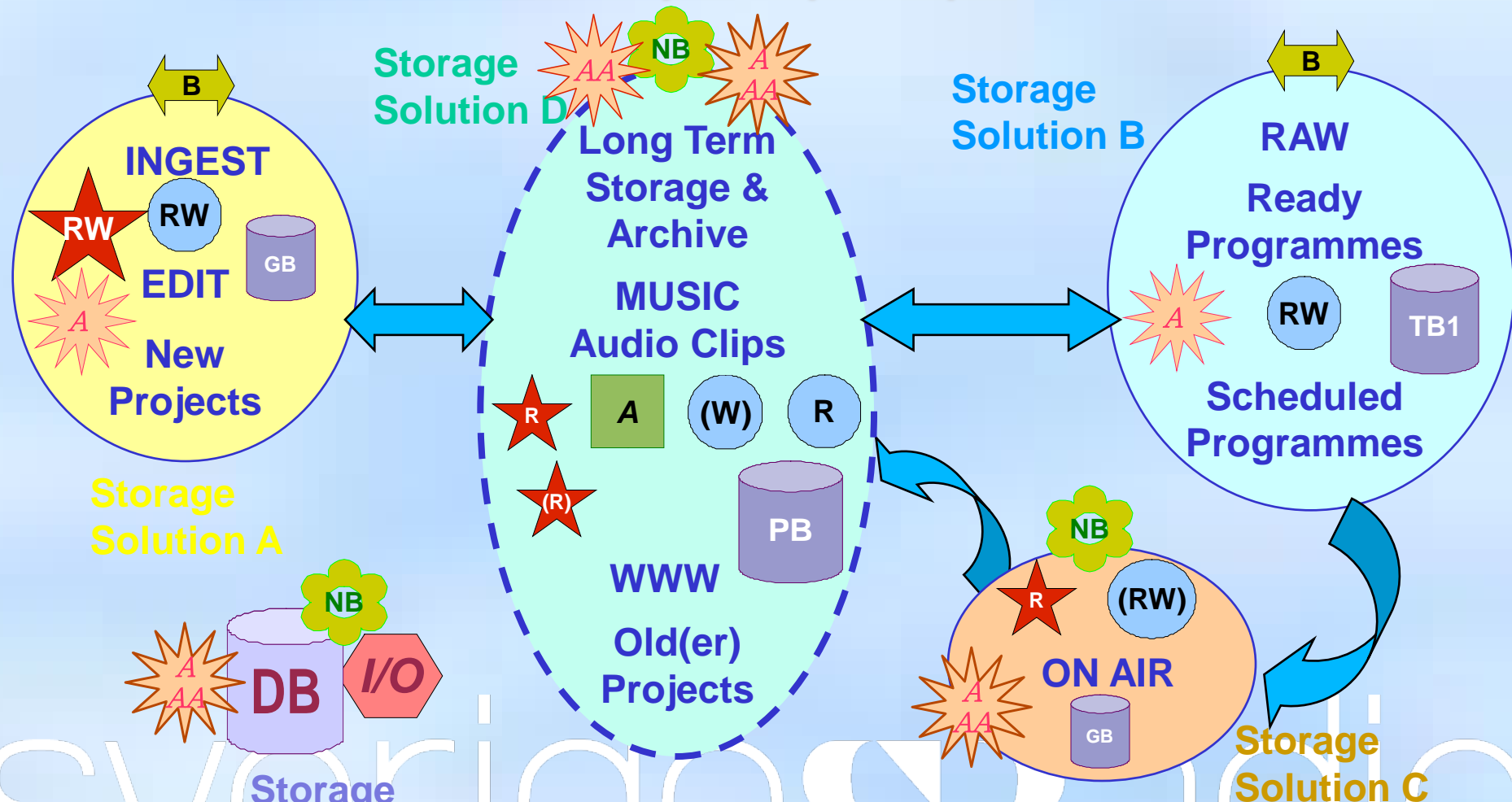
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Media Storage Needs – in a technical & economical Life Cycle perspective



Media Storage Needs – in a technical & economical Life Cycle perspective



Media Storage Needs – in a technical & economical Life Cycle perspective

- Storage Solution A** Different requirements call for different solutions –
- Storage Solution B** with different life cycles
- Storage Solution C**
- Storage Solution D** 'Sometimes a big slow bus is just a better choice than
- Storage Solution E** a fast Ferrari'

Media Storage Needs – in a technical & economical Life Cycle perspective

- Storage Solution A**
 - Storage Solution B**
 - Storage Solution C**
 - Storage Solution D**
 - Storage Solution E**
- If every solution is optimized for the actual requirements (Storage capacity, Management, Access, Performance, Scalability and Migration)
- = **Better value for €**
- = **Better media services**

Media Storage Needs – in a technical & economical Life Cycle perspective

The Bottom Line:

- Know your production process(es)
 - Analyze the work flow and requirements
 - Storage capacity, Performance & Access patterns, Availability & Resilience
 - Find your Storage and Service Classes
 - Risk analysis!

Media Storage Needs – in a technical & economical Life Cycle perspective

The Bottom Line:

- Add a Life Cycle perspective
 - Future Scalability
 - Data and/or System Migration
 - Management resources (tools, time, skills)
 - The commitment for Long Term and Archives

Media Storage Needs – in a technical & economical Life Cycle perspective

The Bottom Line:

- Consolidate with 'wisdom'
 - One size seldom fits all
 - Review your Storage & Service Classes
 - Include the Life Cycle perspective
 - **Risk analysis!**

Thank You!

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