HYBRID CLOUD EVOLUTION:

Rocking Around the World Innovative Data Sharing in a Digital World

LRS
IT SOLUTIONS

How did we get to this point in technology? How has data become such an important aspect of almost every aspect of life and culminated in the innovation of Cloud computing?

The truth is that it has always been there.

Less defining and leaning more towards the recreational, data in the form of music recording has increasingly inhabited our lives since the 1800's and the development of music and sound recording is simply the early stages of data collection and storage.

Technology changes as much out of curiosity as it does from necessity, and the innovation that has driven the evolution from the early 1800's has prompted significant social changes along the way. As soon as we have something, we want to be able to do faster, better, smaller and in the terms of computing challenges, more securely. Businesses need to adapt and change to overcome what has been placed in front of them due to fierce competition, and customer expectations – both internal and external.

YOU CAN'T REALLY IMAGINE MUSIC WITHOUT TECHNOLOGY.

We originally thought that the advancements in music and data, were separate excursions but now we can see that music recording was an essential precursor to our current day data solutions.

It was inevitable they would meet and as the world explored the possibilities of recording data for purposes beyond music, data joined the dance and the inseparable technologies that exist today were developed.

Modern day cloud technology delivers agility, reduced costs, and enhanced access to worldwide resources and is the latest in a stream of transformative technological breakthroughs that allow significant social transformations when they land.

We are still learning about the social gains from cloud-based data driven insights, as we study this era, and it continues to evolve. We have experienced the progression of formats for recording data that go back further than you may think, and it all begins with the desire to record and share music.

> **"All music is based in one way or the other, or influenced through the ages, on technology."**
>
> *Hans Zimmer, German film score composer and record producer*

Join us as we journey from the very beginning of data recording. From the original spoken word, through formats, trends, and systems that enabled cultural revolutions, outpourings of artistic expression and ultimately to present day where there is no limit to what we can achieve with technologies that were once simply fantastical.

It All Began with a Nursery Rhyme

Thomas Edison created the first recording device back in 1877. It was the mechanical phonograph cylinder and while not very practical it was an effective way of sharing data in the form of music to a broader audience and with future generations.

Not exactly 'Big Data' level, as the first thing he recorded was a recitation of 'Mary Had a Little Lamb' but an astounding achievement and the realization of a dream that gave birth to every other data recording device that followed.

Later, it was discovered that Edison was pipped at the post by 17 years, listening to the first ever recording by Édouard-Léon Scott de Martinville, who also invented the phonautograph, but his version could only record not play sounds. The recording was translated from "scrawls on paper" to a playable digital audio file in 2008.

JAZZED
BY ELECTRICITY

The 1920s were dubbed as the decade that began the era of modern music, with 1924 being the year that recording transformed from mechanical to electrical devices that expanded the reproducible range by more than an octave at both the low and high ends. Henry C. Harrison at Bell Labs developed a matched-impedance recorder that consisted of a condenser microphone, balanced-armature speaker, tube amplifier, and a rubber-line acoustic recorder with a long-tapered horn attached.

Recordings by iconic jazz musician Louis Armstrong were a feature of the era and can still be enjoyed today because of the quality of the recordings.

DATA'S vinyl DEBUT

Music recording became more portable in 1948 when Columbia Records produced the LP, 33 RPM 12-inch-long play recordings with the EP, 45 RPM 7-inch 'extended-play single' recordings being produced not long after by RCA.

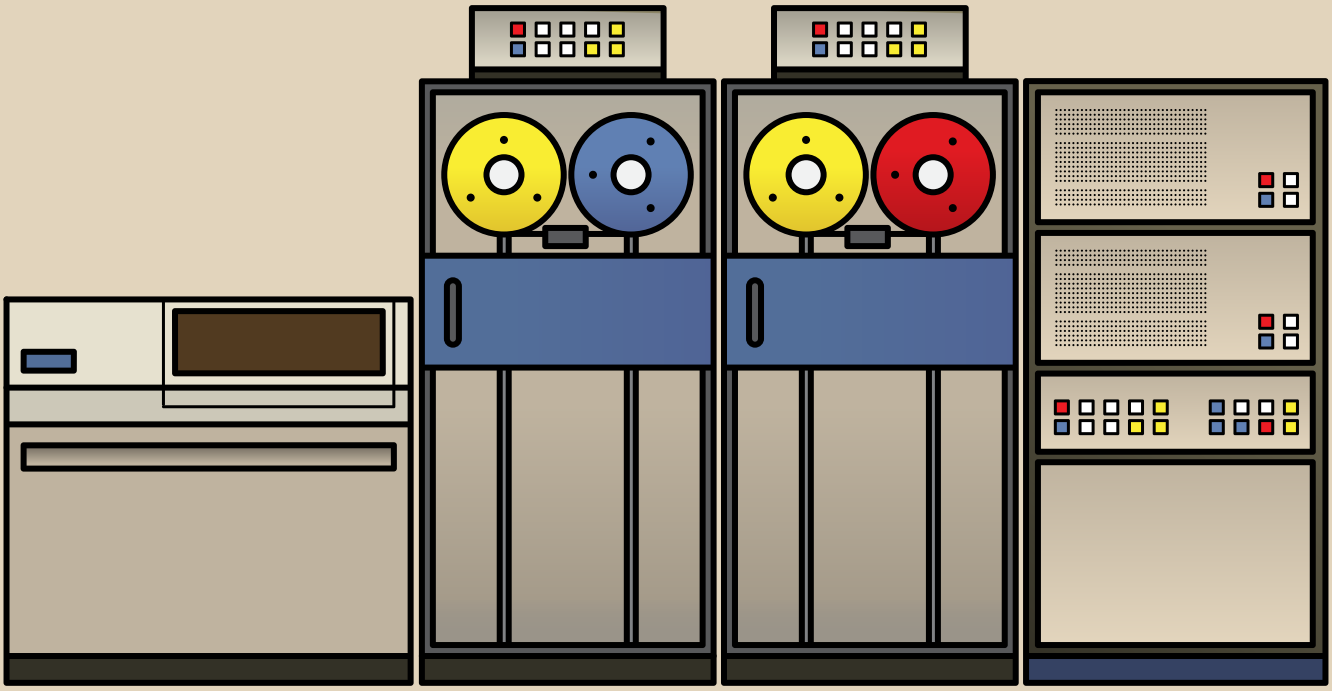
These new formats were produced in vinyl rather than the traditional Shellac to reduce breakages during transport. The biggest drawback was the size and portability. Record players were not easy to transport and soon the music industry was looking for an easier format that consumers could easily take with them wherever they were going.

MAINFRAME

TAKES ON BIG DATA

Launched in 1951, mainframes were powerful and reliable and designed to what was Big Data at the time. They increased computing processing ability and had literally no downtime but were very expensive.

Today, they are high-performance systems with huge memory and processors and the capacity to handle billions of simple transactions, and calculations in real-time, and are critical to commercial databases and transaction servers.



Rocking Scalable Solutions

The 1960s were about accessibility and scalability, the smaller the better, as it made it easier to transport and could be taken and played anywhere. Hence the cassette and 8-track tape recording made their debut onto the music recording scene.

Cassettes paved the way for portable players and convenient listening on the move. With the boom in population, car ownership was on the rise and music for cruising was popular. Cassettes took over for popularity but in 1966 8-track players were an optional extra in Ford vehicles.

In computing, the cloud was getting closer with distributed systems, a combination of various independent systems that appear to the user as a single entity and allowed resources to be shared while utilizing them effectively.

They were scalable, continuously available and worked harmoniously, however the difficulty was that all of the systems were required to have the same physical location to function. This led to the birth of mainframe, cluster, and grid computing.

FLOPPY DISKS AND HARDWARE VIRTUALIZATION

IBM launched the first 8-inch floppy disk to the market in 1972, reduced it to 5 ¼ inches in 1976 and to its eventual format 3 ½ inches in 1982. A select number of artists tried releasing albums on floppy disks, but it didn't turn out to be a popular way or distributing music to listeners.

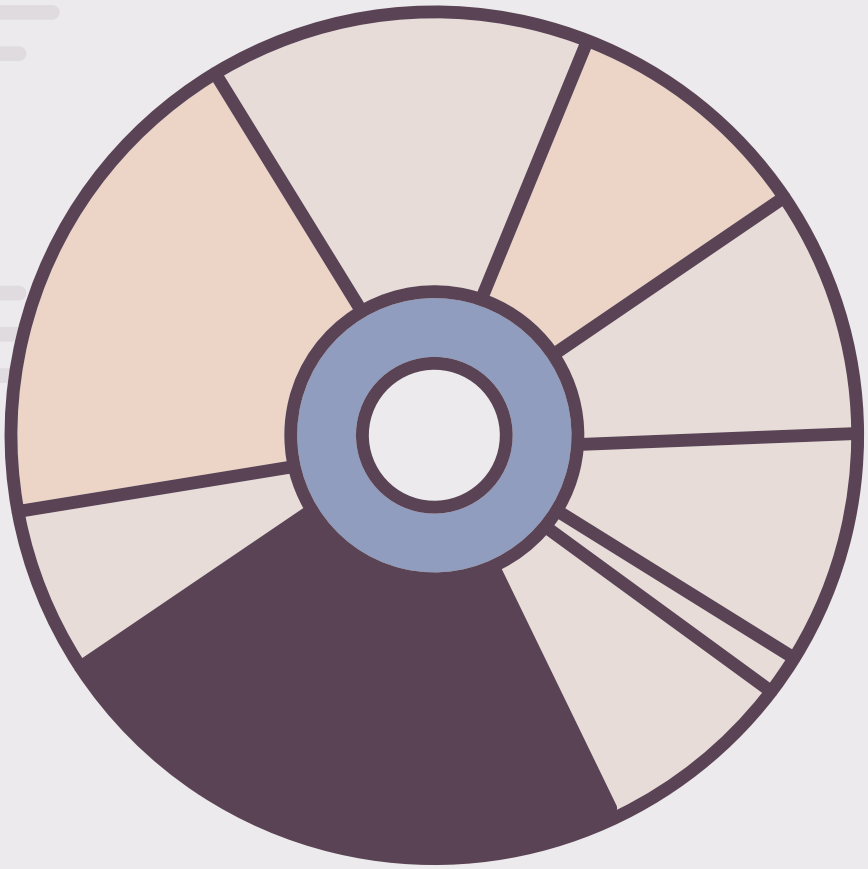
Portable players were not available for this format and the contents could only be accessed via computer. This trend was short lived for music, but floppy disks for data had a much longer reign.

Virtualization, a key aspect of cloud computing, began in the 1970s and is the foundation that enterprises such as Amazon EC2, and VMware vCloud work on for private clouds. A virtual layer is created over the top of the hardware that enables the multiple instances simultaneously on hardware by a user. Users could create a virtual machine to mimic a genuine PC in every way with a practical and working framework.

CLUSTERS MASH-UP & COMPACT SOLUTIONS

The initial idea for CDs was floated in 1974, however it wasn't until 1982 that it became a viable format due to a collaboration between Phillips and Sony. It was a huge milestone and the beginning of the end of physical formats. MP3 recordings and computers quickly took over with the invention of the internet and computing becoming increasingly sophisticated and accessible.

Cluster computing was developed to address the issue of cost with its mainframe predecessor. Every unit in the cluster connected to the others via a high bandwidth network, had significant computing power, and additional nodes that could easily be added to the cluster. The issue of cost was largely solved however they still all had to be physically located together.



BIRTH OF THE WEB

Grid computing introduced the ability to have systems located in different geographical locations that could connect using the internet and was the predecessor of cloud computing. The systems comprised of heterogeneous nodes and were owned by different organizations. It did solve some of the issues experienced with previous incarnations, but when the distance between the nodes, increased issues arose due to network issues and bandwidth availability.

The culmination of technological advances enabled the World Wide Web to be launched in 1991, with over a million computers being connected to the internet. Next came the dotcom revolution and ecommerce gained popularity as client serving distributed computing was implemented so that front end users could create websites on the World Wide Web.

The MP3 as first patented in 1989 but it wasn't until 1998 that it was enforced, and licensing fees were paid with MP3 players launching the next year. This technology was the precursor to platforms such as iTunes where for the first time, users could easily search, buy and play music.

Cloud Computing

A Symphony of Transformation

Initially the term cloud was used to refer to the empty space between the provider and the end user. However, in 1997 it was further defined as:

> **"Cloud Computing as the new computing paradigm, where the boundaries of computing will be determined by economic rationale, rather than technical limits alone."**
>
> *Professor Ramnath Chellapa of Emory University*

At the end of the 90s, the cloud gained popularity with enterprise as they gained a better understanding of what services could be utilized and how valuable it could be.

In 1999, Salesforce was launched as the first example of an enterprise running applications within the cloud. Salesforce could be downloaded and accessed by anybody that had the internet, software was available on-demand and cost effectively all online.

CLOUD TAKES HOLD

IN THE 21ST CENTURY

Amazon launched its web-based retail services in 2002 and cloud computing as infrastructure enabled them to utilize the capacity of their computer more efficiently. Other enterprises soon followed their example.

Web 2.0 was launched in 2003 that gave more flexibility to web pages and was the technology behind interactive and dynamic web pages and made social media platforms possible.

Amazon Web Services was launched in 2006 as a public cloud offering online services. One service in particular, Amazon Mechanical Turk, offered cloud-based services such as computation, storage and human intelligence. Another, Elastic Compute Cloud (EC2), rented virtual computers to consumers who could then use their own apps and programs.

WHERE ARE WE NOW?

Evolution in data storage and cloud computing technology is inevitable and is a necessity for the survival of businesses. The traditional ways of doing business have changed and, in that, so have traditional ways of delivering IT Infrastructure and the storing and sharing data and applications. Businesses need to adapt and change to overcome what has been placed in front of them due to fierce competition, and customer expectations (customers: internal & external).

Public Cloud

The general population can access the public cloud, a large cluster of infrastructure available virtually via subscription. Infrastructure is located in the data centers of the vendor and not physically accessible by clients and it is generally the most cost effective of the available cloud options.

Examples include:

- Alibaba Cloud
- Microsoft Azure
- IBM SoftLayer
- Amazon Cloud

Private Cloud

Enterprises can assemble a cluster of computing resources and create a private cloud that is only used by their organization. Private clouds are more secure than a public cloud because each one has a single customer; a good example is VMware.

Hybrid Cloud

When you combine a public and private cloud you get a hybrid cloud and gain access to the best of both options. For instance, host sensitive and mission critical data in the private cloud and use the public cloud for other data. Hybrid cloud computing gives an organization the freedom to deploy private cloud on-premises that can host critical and sensitive workloads while using a third-party public cloud service provider for less-critical computing resources, test and development workloads for example.

WHY THE HYBRID CLOUD MAY PROVE TO BE A BETTER CHOICE

Better Security
A hybrid cloud strategy allows organizations to select dedicated servers as well as network devices. These can restrict or isolate access when the need arises.

Cloud Bursting
Cloud bursting refers to a model for application deployment where an application runs in a data center or private cloud and bursts into a public cloud when computing capacity demand spikes. The advantage here is that an organization only needs to pay for extra computing resources as and when needed.

Higher Level of Control Over Big Data Analytics
For organizations that have to deal with Big Data, migrating to a hybrid cloud model provides a near perfect solution that allows them to serve their customers better and assist their employees at the same time.

Transitioning from Existing Infrastructure
Organizations cannot afford to risk any downtime when attempting to transition to a cloud infrastructure. A hybrid cloud model gives organizations the best of the private and public cloud minus any downtime.

Simplified Costs and Customer Satisfaction
Organizations that adopt the hybrid cloud can achieve a balance between the need for being cost-effective as well as the required security when keeping critical workloads and sensitive information secure on the private cloud.

Once successfully integrated with a business's existing infrastructure, the hybrid cloud solution proves to be a cost-effective way to extend capabilities to the cloud. Irrespective of whether a company is already growing or is planning for future growth, the scaling of on-premises infrastructure often proves to be cost intensive.

A Technology Safe Harbor
'Application sprawl' is a term that refers to the idea of businesses buying IT resources from external parties for many different reasons.

Increased Architectural Flexibility
A robust hybrid cloud strategy allows organizations to align workloads according to where they fit best. Hybrid cloud architecture can be aligned in a manner to make maximum use of performance requirements that a dedicated server can offer.

A hybrid cloud model is a great way to manage existing business requirements while supporting current and future growth. This allows for innovation while, at the same time, limiting costs. By building a bridge between a business's existing infrastructure solutions and futuristic infrastructure technology, companies can position themselves towards an increasingly stable and innovative future.

HYBRID CLOUD SCENARIOS TODAY

Dynamic or frequently changing workloads. Use an easily scalable public cloud for your dynamic workloads, while leaving less volatile, or more sensitive, workloads to a private cloud or on-premises data center.

Separating critical workloads from less-sensitive workloads. You might store sensitive financial or customer information on your private cloud and use a public cloud to run the rest of your enterprise applications.

Big data processing. It's unlikely that you process big data continuously at a near-constant volume. Instead, you could run some of your big data analytics using highly scalable public cloud resources, while also using a private cloud to ensure data security and keep sensitive big data behind your firewall.

Moving to the cloud incrementally, at your own pace. Put some of your workloads on a public cloud or on a small-scale private cloud. See what works for your enterprise and continue expanding your cloud presence as needed—on public clouds, private clouds, or a mixture of the two.

Temporary processing capacity needs. A hybrid cloud lets you allocate public cloud resources for short-term projects, at a lower cost than if you used your own data center's IT infrastructure. That way, you don't overinvest in equipment you'll need only temporarily.

Flexibility for the future. No matter how well you plan to meet today's needs, unless you have a crystal ball, you won't know how your needs might change next month or next year. A hybrid cloud approach lets you match your actual data management requirements to the public cloud, private cloud, or on-premises resources that are best able to handle them.

Best of both worlds. Unless you have clear-cut needs, fulfilled by only a public cloud solution or only a private cloud solution, why limit your options? Choose a hybrid cloud approach, and you can tap the advantages of both worlds simultaneously.

THE POWER TO CONNECT

With the right advice and solutions, IT leaders can seamlessly integrate IBM Power Systems into their overall hybrid cloud strategy. Whether you are looking to streamline virtual machine deployments, operations via a private cloud, leverage the flexibility of public cloud, modernize applications with microservices, containers and Kubernetes, innovate with AI or build a hybrid cloud, POWER has a solution.

Let us help you identify the next steps in your journey to the hybrid cloud world. Reach out to the LRS® Cloud Solutions Team to start the conversation or to schedule a free consultation:
https://www.lrsitsolutions.com/cloud/

> **"We've Got the power to take us anywhere we wanna go."**
>
> *The Pointer Sisters*