

Data Engineering 101:
Synapse vs Bigquery vs Redshift

Azure Synapse Analytics

VS



Google BigQuery

VS



Amazon RedShift



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Data Storage



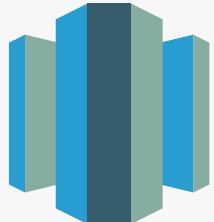
Synapse

Supports SQL Data Warehouse, Data Lake



BigQuery

Columnar storage using Capacitor format

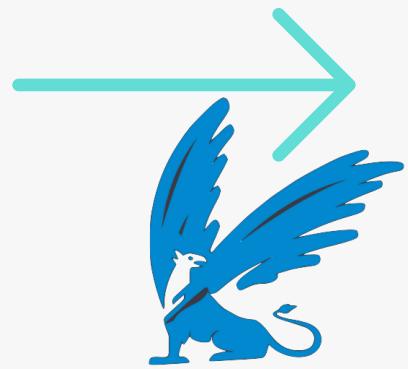


RedShift

Columnar storage with compression techniques



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Query Language



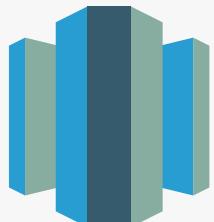
Synapse

T-SQL, Spark SQL, Kusto Query Language



BigQuery

Standard SQL (with extensions)

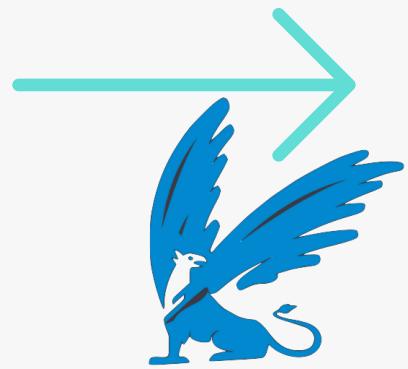


RedShift

SQL (PostgreSQL-based dialect)



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Integration



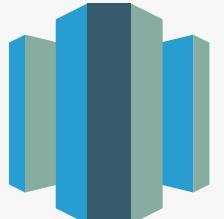
Synapse

Deep integration with Azure ecosystem



BigQuery

Tight integration with Google Cloud services



RedShift

Seamless integration with AWS ecosystem



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Compute and Storage



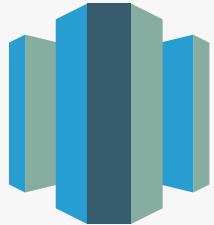
Synapse

Separate compute and storage, serverless options



BigQuery

Serverless, on-demand pricing, scalable storage



RedShift

Compute and storage are separate, with managed options



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Performance Tuning



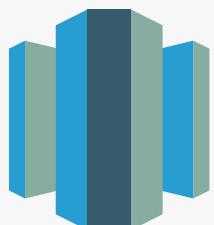
Synapse

Offers automatic and manual tuning options



BigQuery

Automatic performance tuning with no indexes required



RedShift

Requires manual tuning, including sort and distribution keys



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Pricing Model



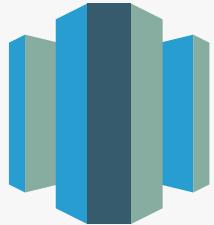
Synapse

Pay-as-you-go, provisioned capacity, serverless



BigQuery

Pay-as-you-go, flat-rate pricing



RedShift

On-demand or reserved instances, predictable
pricing



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Data Lake Integration



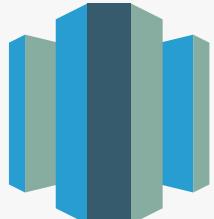
Synapse

Tight integration with Azure Data Lake Storage



BigQuery

Can directly query data in Google Cloud Storage



RedShift

Can query data in Amazon S3 with Spectrum



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Security



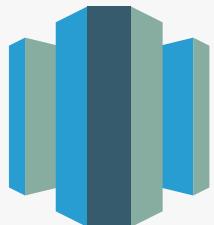
Synapse

Azure AD, RBAC, encryption at rest and in transit



BigQuery

Google IAM, encryption by default



RedShift

IAM, VPC, encryption at rest and in transit



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Machine Learning Integration



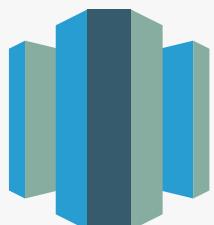
Synapse

Integrated with Azure Machine Learning, Synapse Studio



BigQuery

Integrated with Google AI Platform



RedShift

Integrated with Amazon SageMaker



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Concurrency



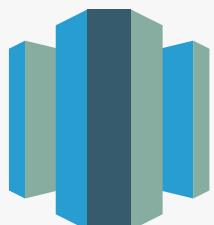
Synapse

Supports high concurrency with Synapse SQL pools



BigQuery

Highly scalable with automatic concurrency management



RedShift

Concurrency scaling via dedicated clusters



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Data Partitioning



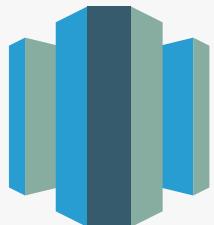
Synapse

Automatic and manual partitioning, including sharding



BigQuery

Automatic partitioning using partitioned tables



RedShift

Requires manual distribution and partitioning



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Data Ingestion



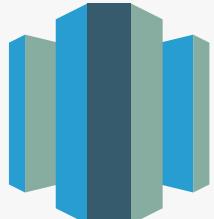
Synapse

Supports batch, real-time, and streaming ingestion



BigQuery

Supports batch and streaming ingestion



RedShift

Supports batch and streaming ingestion



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Analytics Engine



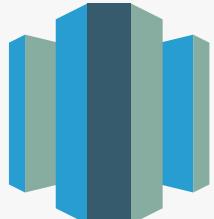
Synapse

Combines SQL, Spark, and Data Explorer engines



BigQuery

Optimized for analytical queries, serverless engine



RedShift

OLAP engine optimized for complex queries



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Data Processing



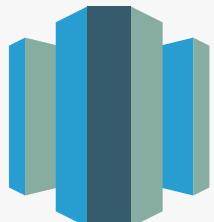
Synapse

Supports batch, streaming, and real-time data processing



BigQuery

Optimized for real-time and batch processing



RedShift

Focuses on batch processing



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Cross-Region Replication



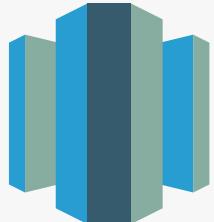
Synapse

Geo-redundant storage, cross-region failover



BigQuery

Multi-region replication, high availability



RedShift

Cross-region snapshot copy



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Backup and Restore



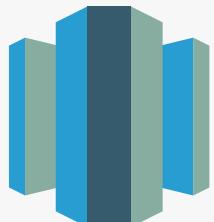
Synapse

Automated backups, point-in-time restore



BigQuery

Automated backups, point-in-time recovery



RedShift

Automated backups, manual snapshots



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Data Sharing



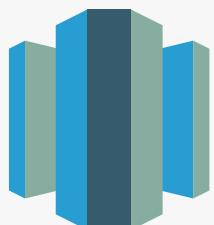
Synapse

Supports data sharing across Azure subscriptions



BigQuery

Data sharing within and across Google Cloud projects



RedShift

Redshift Data Sharing, AWS Data Exchange



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Scaling



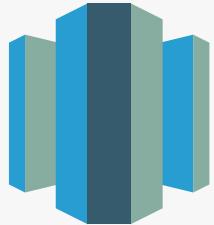
Synapse

Scale compute independently of storage



BigQuery

Scales automatically based on query load



RedShift

Elastic resize, concurrency scaling



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ETL/ELT Integration



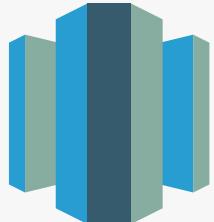
Synapse

Integrated with Azure Data Factory and Data Bricks



BigQuery

Integrated with Google Dataflow and Data Fusion



RedShift

Integrated with AWS Glue and Data Pipeline



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Cost Optimization



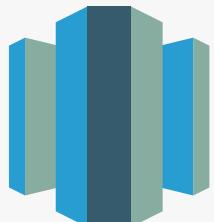
Synapse

Offers reserved instances and serverless options



BigQuery

Supports flat-rate and on-demand pricing models



RedShift

Reserved instances and on-demand pricing



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Data Engineering 101:
Synapse vs Bigquery vs Redshift

Data Governance



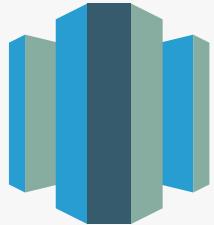
Synapse

Integrated with Azure Purview



BigQuery

Supports Google Cloud Data Catalog



RedShift

Integrated with AWS Lake Formation and IAM



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Query Performance



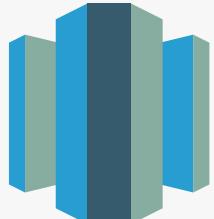
Synapse

Offers materialized views, result caching



BigQuery

Supports materialized views, result caching



RedShift

Supports materialized views, result caching



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BI Tool Integration



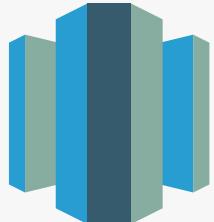
Synapse

Integrated with Power BI



BigQuery

Integrated with Google Data Studio and Looker



RedShift

Integrated with Amazon QuickSight and third-party
BI tools



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Real-time Analytics



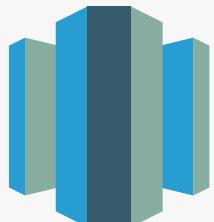
Synapse

Supports real-time analytics with Azure Stream Analytics



BigQuery

Real-time processing with BigQuery



RedShift

Supports real-time analytics with Kinesis and Redshift



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Multicloud Support



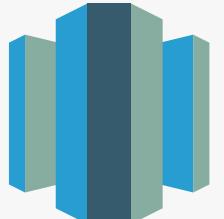
Synapse

Can connect to other clouds via Azure Arc



BigQuery

Supports multicloud via Anthos



RedShift

Primarily focused on AWS, limited multicloud options



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Compliance and Certifications



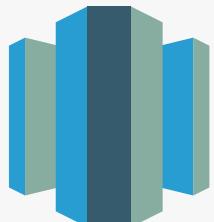
Synapse

Complies with major standards like GDPR, HIPAA



BigQuery

Complies with major standards like GDPR, HIPAA



RedShift

Complies with major standards like GDPR, HIPAA



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Ecosystem



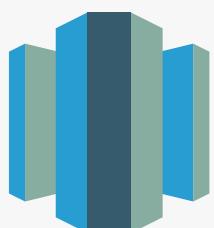
Synapse

Part of Azure Synapse workspace, integrates multiple services



BigQuery

Part of Google Cloud Platform ecosystem, integrates multiple services



RedShift

Part of AWS ecosystem, integrates multiple services



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Data Warehousing



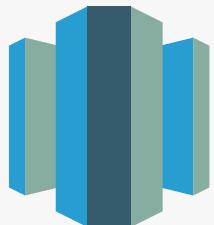
Synapse

Enterprise-scale data warehousing with complex queries



BigQuery

Large-scale data warehousing with serverless flexibility



RedShift

OLAP workloads with complex queries and large datasets



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Real-time Analytics



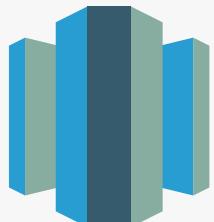
Synapse

Real-time analytics and dashboards in Synapse Studio



BigQuery

Real-time analytics on streaming data



RedShift

Real-time data processing and analytics using Kinesis



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Machine Learning



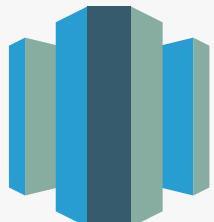
Synapse

Advanced analytics and machine learning with
Azure ML



BigQuery

Machine learning at scale with BigQuery ML



RedShift

Machine learning with Amazon SageMaker



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Big Data Analytics



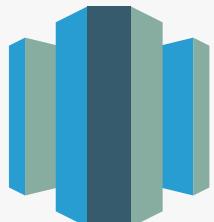
Synapse

Big data processing and analysis using Spark and SQL



BigQuery

Scalable big data analytics with built-in ML features

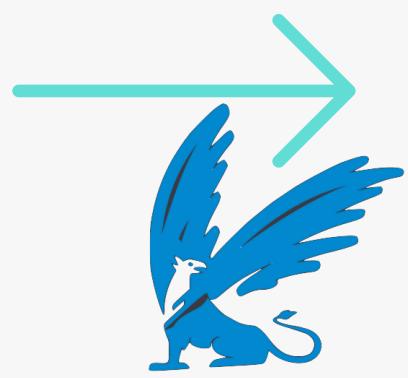


RedShift

Processing and analyzing large datasets with OLAP capabilities



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Data Integration



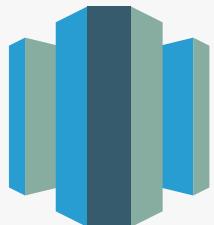
Synapse

Integration with various data sources using Data Factory



BigQuery

Integration with multiple Google Cloud services



RedShift

Integration with AWS data sources using AWS Glue



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Reporting and Visualization



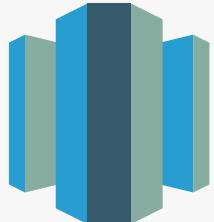
Synapse

Creating reports and dashboards using Power BI



BigQuery

Integrated with Google Data Studio for reporting



RedShift

BI reporting with Amazon QuickSight and third-party tools



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Cross-Cloud Data Sharing



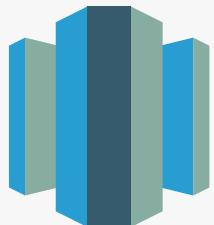
Synapse

Sharing data across different Azure regions and clouds



BigQuery

Seamless data sharing across Google Cloud projects



RedShift

Sharing data across AWS regions and accounts



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Disaster Recovery



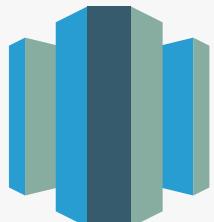
Synapse

Cross-region replication and geo-redundancy for DR



BigQuery

Multi-region availability and replication for DR



RedShift

Cross-region replication for disaster recovery



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Data Governance



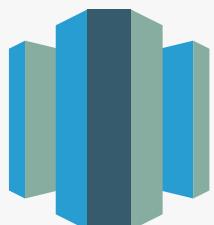
Synapse

Managing and governing data with Azure Purview



BigQuery

Data governance and cataloging with Google Data Catalog



RedShift

Governance and cataloging with AWS Lake Formation



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