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"Direct-to-cloud" technology innovations that open the cloud for big data innovations

Spring 2016

MOVING THE WORLD'S DATA AT MAXIMUM SPEED

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ASPERA'S MISSION

Creating next-generation transport technologies

that move the world's digital assets at maximum speed,

regardless of file size, transfer distance and network conditions.

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ABOUT ASPERA

Software technology company focused on innovation in new data transfer technologies

Based in Emeryville, California

Founded in 2004, now part of IBM

Creators of the patented FASP® protocol

- Innovative, highly efficient bulk data transport technology
- Ranked first in every WAN transfer throughput benchmark
- Unique and core to all Aspera's high-performance data transfer software
- Outperforms competing software and hardware WAN acceleration solutions

Patents: FASP® Bulk Data and Dynamic Bandwidth Control issued in USA and many other countries

Markets Served

Media and Entertainment	Federal Government	Engineering & Manufacturing	Architecture & Design
Life Sciences & Pharmaceutical	Healthcare	Software & Gaming	Financial Services
Oil & Gas	Enterprise IT	Advertising & Publishing	Legal & eDiscovery

Big data explosion

- 90% of digital data today file-based or unstructured
- Mix of file sizes—but larger and larger files the norm

Growth and diversity in IP networks - Media, bandwidth rates, and conditions

- Variable bandwidth rates (slow to super-fast)
- Bandwidth rates increasing—costs decreasing
- Network media remains diverse (terrestrial, satellite, wireless)
- Conditions vary—all networks prone to degradation over distance

Global workflows - Real time experiences over WANs are expected

- Teams are geographically dispersed
- Over distance, network conditions degrade to majorly impact large transfers & streams
- Contemporary TCP acceleration solutions not designed for big data transfer and replication

Cloud computing grows up

- More choices: SoftLayer, AWS, Microsoft Azure, OpenStack, Cleversafe, Google, etc.
- No longer a niche - Netflix (transcoding), MTV (global video

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FUNDAMENTAL BIG DATA TRANSPORT CHALLENGES

Size & Volume

Can't reliably send, share, & sync large files & data sets over global WANs

Speed

Unable to move big data at high-speed with existing network bandwidth

Distance

Subject to slower times and more congestion for global file transfers across public internet, MPLS corporate networks, and wireless networks

Control

Need greater security & more control in moving files & data sets to employees, customers, vendors, & external

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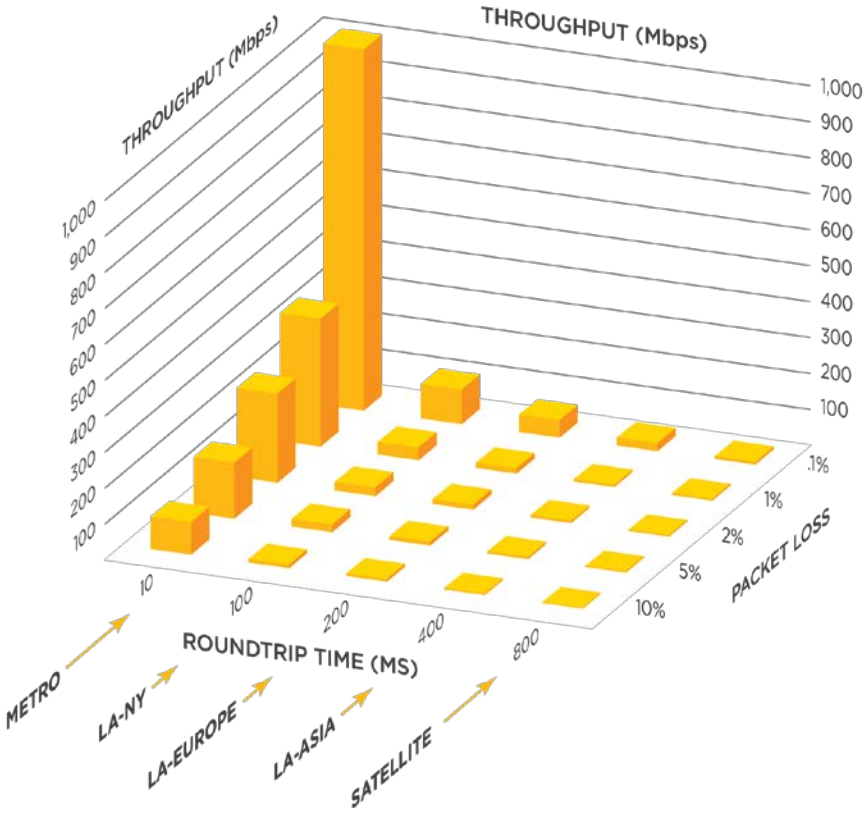
CHALLENGES WITH TCP AND ALTERNATIVE TECHNOLOGIES



Note: Table displays throughput degradation of TCP transfers on a 1Gbps network as estimated round trip time and packet loss increases with distance.

Distance degrades conditions on all networks

- Latency (or Round Trip Times) increases
- Packet loss increases
- Fast networks are just as prone to degradation

TCP performance degrades severely with distance

- TCP was designed for LANs and does not perform well over distance
- Throughput bottlenecks are severe as latency & packet loss increase

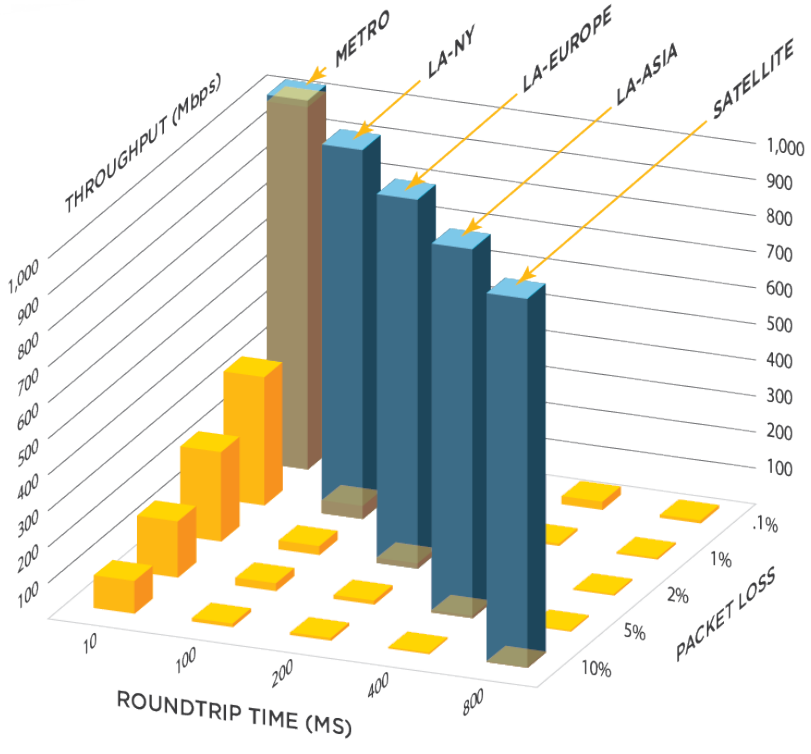
TCP does not scale with bandwidth

- TCP designed for low bandwidth
- Adding more bandwidth does not improve throughput

Alternative technologies

- TCP-based - Network latency & packet loss must be low to work well
- UDP blasters - Inefficient use of bandwidth leads to congestion
- Modified TCP - Does not scale well on high-speed networks
- Data caching - Inappropriate for many large file

FASP® – HIGH-PERFORMANCE DATA TRANSPORT



Note: The relative bandwidth utilization for FASP transfers over a 1 Gbps network are immune to latency (distance) with very little effect from packet loss.

Maximum transfer speed

- Optimal end-to-end throughput efficiency
- Transfer performance scales with bandwidth independent of transfer distance and resilient to packet loss

Congestion avoidance and policy control

- Automatic, full utilization of available bandwidth (fair play)
- On-the-fly prioritization of transfers
- Set caps on bandwidth allocation for transfers

Uncompromising security and reliability

- Secure, SSH user/endpoint authentication
- AES-128 to 256 cryptography of every packet in transit
- Encryption at rest (EAR) requires second password
- FIPS 140-2 compliant, built on the open SSL libraries
- Automatic resume of partial or failed transfers

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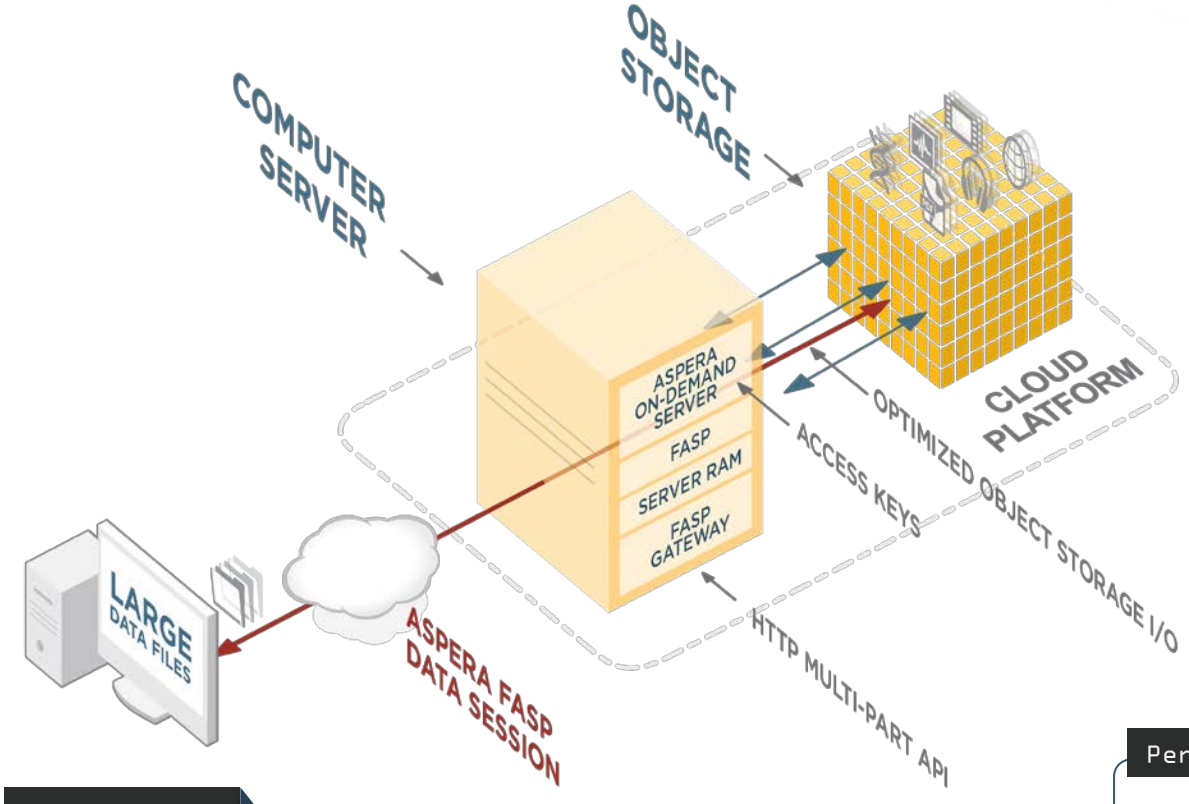
ASPERA FILES
WITH DIRECT-TO-CLOUD OBJECT STORAGE



SOFTLAYER an IBM Company

amazon web services

Microsoft Azure

Google Cloud Platform

Akamai

Limelight NETWORKS

cleversafe

Road Map

openstack CLOUD SOFTWARE

rackspace the open cloud company

Performance

EFFECTIVE THROUGPUT

Up to 1.5 Gbps
(per server, Extra Large Instance)
15 TB per 24 hours

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FASP® – PERFORMANCE BREAKTHROUGH

MOVING A 10GB FILE		Across US	US - Europe	US - Asia
Legacy Transport	100 Mbps	10-20 Hours	15-20 Hours	Impractical
	1 Gbps			
	10 Gbps			
Aspera FASP™	100 Mbps	14 Min	14 Min	14 Min
	1 Gbps	1.4 Min	1.4 Min	1.4 Min
	10 Gbps	8.4 Sec	8.4 Sec	8.4 Sec

Location Agnostic

FASP transfer speeds remain virtually constant as transfer distances increase while FTP speeds dramatically decrease

Predictable & Reliable

FASP transfer times decrease linearly as bandwidth increases. However, FTP transfer times don't improve with bandwidth

Versatile

Supports massive file sizes (500 GB+) as easily as very large sets (millions) of small files

FASP – MAXIMUM SPEED WITH NO NETWORK SATURATION

Extraordinary bandwidth control that doesn't saturate the network

- Automatic detection & full utilization of available bandwidth with "fair" policy protection of other network traffic
- Allows "bursts" in TCP traffic and reclaims unused bandwidth as it as it becomes available

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FASP® ADAPTIVE RATE CONTROL

Real-time prioritization of transfers

- On-the-fly, per flow, user and job prioritization of transfers
- Concurrent transfers adjust bandwidth on the fly, allocating available bandwidth based on transfer priority

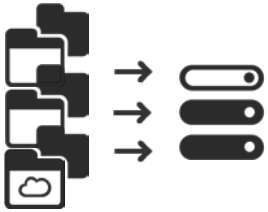
System-wide monitoring and reporting

- Real-time progress and performance analysis along with detailed transfer history, logging and manifest

Extraordinary bandwidth control

- Automatic, full utilization of available bandwidth with protection of other network traffic with "fair" policy

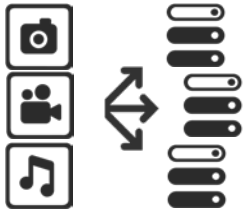
What are the most common ways customers use Aspera solutions?



Mass Transport

Receive/ingest GBs to TBs of big data files every day at high speed from global teams and partners with commodity hardware using standard IP WANs instead of shipping hard drives or building expensive hardware solutions that can't reasonably scale.

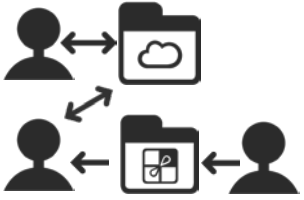
Solutions can run on-premises or in the cloud and support simple manual transfers and sophisticated automated workflows.



Distribution

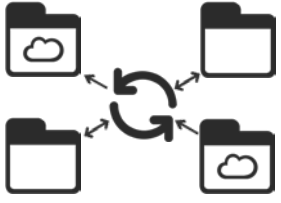
- Quickly distribute large files and folders between globally dispersed points on an ad-hoc basis where the throughput is low causing long transfer
- Enhance or replace expensive content distribution networks that move & store duplicate large files to edge servers where they can be delivered quickly

What are the most common ways customers use Aspera solutions?



Share & Exchange

- Share and collaborate quickly and easily all over the world within a shared folder structure on large work-in-progress files or final digital files that can be stored in a data center or cloud storage anywhere
- Securely send and receive files and directories of any size with users anywhere using a simple email-style interface from a desktop, laptop, or mobile device



Replication & Sync

Replicate and synchronize massive sets of files between many storage sites and infrastructures in a multidirectional, asynchronous fashion across global WANs at high-speed

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CUSTOMER SUCCESS STORIES

NETFLIX

With over 23 million streaming members globally, Netflix delivers streaming movies and TV shows to over 700 different devices - PCs, internet-connected TVs, gaming consoles, tablets and smart phones.

Solution: With over 50 terabytes of new content a month from over 200 global partners, Netflix uses Aspera On Demand Direct-to-S3 technology to move, process and store content in Amazon Web Services S3 storage.

Benefit: High-speed FASP™ transfers direct to S3 storage allow Netflix to leverage the extreme scalability of AWS, eliminating the need to build its own data centers and enabling on demand compute capacity control.

at&t U-verse

AT&T U-verse delivers advanced digital TV, high-speed Internet, and digital home phone service together over state of the art fiber optic technology and computer networking as a fully integrated experience.

Solution: High-speed digital file transfers of ad content from sponsors into an end-to-end fully automated ad-ingest and file-based workflow that verifies, schedules, and confirms delivery and broadcast.

Benefit: "Lights out" automation enables large scale ad ingest, with high reliability and service levels driving increased ad revenue and more sponsors at significantly lower operational costs.

UNIVERSAL

Universal Pictures produces major motion pictures such as "Battleship" and "Snow White" - massive projects requiring an army of partners and facilities seamlessly working together to deliver a top-notch final product.

Solution: High-speed, reliable and secure exchange of daily post-production media files (15-30GB each) between multiple companies around the globe using Aspera faspex™.

Benefit: Easy-to-use file transfer solution that's deployed in hours, not weeks and real-time collaboration between geographically distributed teams leading to significant reduction in production cycle times.

Charter
Digital TV • Internet • Telephone

Charter is the fourth-largest cable operator in the US, providing advanced video, high-speed Internet, and telephone services to approximately 5.2 million residential and business customers.

Solution: High-speed delivery of ad content to broadcast and cable TV operators, with automated QC, verification, and closed loop billing.

Benefit: Automation allows a higher rate of more targeted ads leading to more effective advertising and increased subscribers at a much lower cost.

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CUSTOMER SUCCESS STORIES

NCBI

As part of the National Institutes of Health, the National Center for Biotechnology Information coordinates and develops new technology and databases to aid in the understanding of molecular and genetic processes that control health and disease.

Solution: High speed transfer of genomic data and statistics from NIH projects, such as the 1000 Genomes Project to researchers.

Benefit: Immediate availability of genetic data throughout the NIH and medical research community ensuring rapid access to data for computational analysis and investigation.

GENOSPACE™
Digital Architects of Genomic Medicine

Genospace integrates clinical, laboratory, and genomic information to deliver decision support and reporting tools to labs and health care providers, powering genomics studies, research trials, and personalized diagnostics.

Solution: High-speed delivery of ad content to broadcast and cable TV operators, with automated QC, verification, and closed loop billing.

Benefit: Automation allows a higher rate of more targeted ads leading to more effective advertising and increased subscribers at a much lower cost.

databiology
Powering Information-Driven Life Sciences

Databiology is a private company that offers a cloud-based enterprise infrastructure for coordinating information management and informatics for all types of genomic data.

Solution: High-speed, secure upload of large genetic datasets to cloud-based storage during new customer set up.

Benefit: Rapidly onboard new customers who want to connect their data to analytical and reporting services in the cloud while ensuring that proprietary data remains secure.

华大基因
BGI

BGI, the world's largest genomics research institute, produces thousands of genomes a day. Using hard drives to send data to customers and partners had proven expensive, error-prone and time consuming.

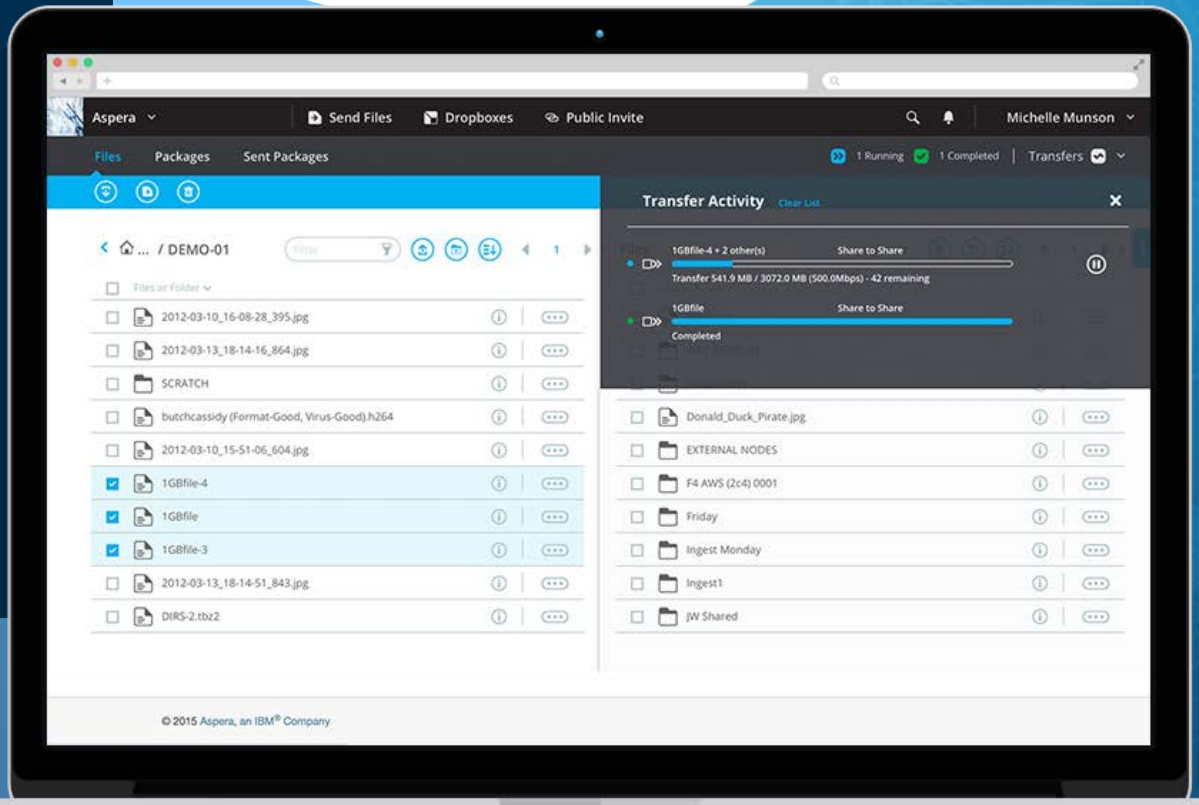
Solution: BGI integrated Aspera's FASP™ high-speed transfer technology into its "EasyGenomics™" cloud-based bioinformatics service and deployed Aspera Connect Server for high speed sequencing data delivery service.

Benefit: With fast cloud transfers, EasyGenomics™ takes advantage of unlimited parallel computing offered by the cloud and Aspera's rich APIs enabled the integration of high-speed transfers directly within EasyGenomics™ web portal.

INTRODUCING THE NEW ASPERA FILES SAAS

Big data sharing and exchange in the cloud

Share and send large files and data sets directly from cloud and on premises storage – located anywhere, to anywhere, with anyone



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WHAT CAN I DO WITH ASPERA FILES?

Built on Aspera's acclaimed FASP® transport technology, easily send & share large **gigabyte** files or massive **terabyte** data sets

Move big data up to **100's of times faster** over long distance and achieve **multi-Gbps speeds** on high bandwidth networks

Store and share your data from any cloud, hybrid or on-premises infrastructure

Secure and safely share your valuable data with enterprise-grade user access **controls** & **encryption**

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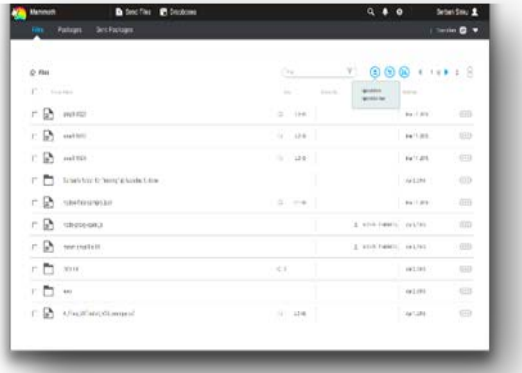
ASPERA FILES: KEY BENEFITS

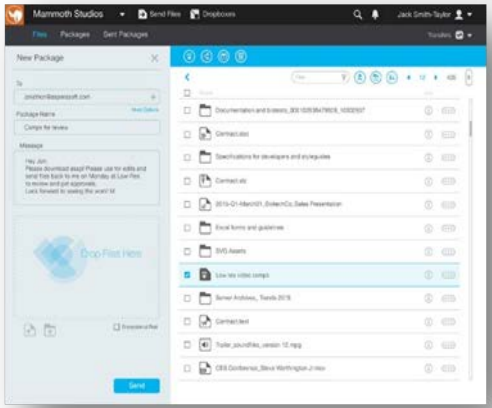
Simplicity

- Companies can easily sign up and instantly share and exchange large files and data sets through individually branded Workspaces
- Sharing is as easy as drag-and-drop regardless of where the content is located, on premises or in the cloud



Performance

- Share and send very large GB files or massive TB data sets with millions of small files quickly, reliably, and securely
- Move big data up to 100s times faster globally over standard WAN
- Achieve multi-Gbps speeds over high performance global networks



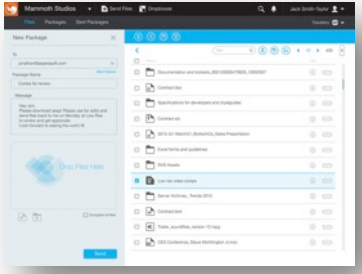
Flexibility

- Store and share your data from anywhere: on premises, hybrid and cloud infrastructure
- Supports all major commercial and open source cloud platforms—IBM SoftLayer Swift, AWS S3, Azure Blob, Google Storage and Openstack Swift

Security

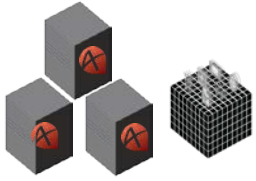
- New distributed access control system offers complete

ASPERA FILES COMPONENTS



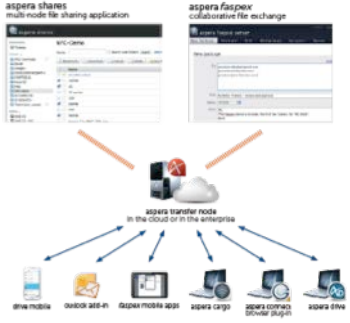
Web User Interface

- Simple and intuitive user experience can be customized and branded
- Organize “Workspaces” to share and exchange files
- Immediately share large files and data sets from on-premises or cloud
- Easily drag and drop to share and exchange any size file or data set regardless of where the files reside – on premises or in the cloud
- Preview media in thumbnail view, keyframe grids and playable media



Built in Transfer and Storage

- Files powers the user experience with the latest FASP high-speed transfer platform that includes the built-in Transfer Cluster Manager with Autoscale technology
- The platform provides built-in multi-tenant elastic scaling to meet variable demand in transfer throughput and storage



Existing Aspera Deployments

- Leverage existing Enterprise, Connect, Point-to-Point, Faspex, or Shares servers running on premises or in the cloud
- Pre-existing server deployments continue to support existing use cases
- Aspera Files provides new centralized access for newly authorized users through branded Organizations and Workspaces

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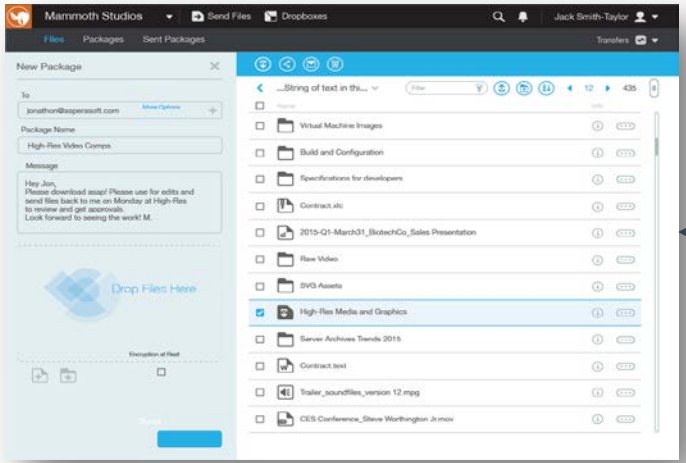
POWERFUL HYBRID DEPLOYMENT



- Consolidated browsing through the Files user interface
- Secure authentication to the transfer server and storage
- Direct integration with cloud object storage (AWS S3, Azure BLOB, Openstack Swift)
- Built-in storage (SoftLayer), and support

Built In

Virtual Machine Images

Build and Configuration

Specifications for Developers

SOFTLAYER
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Customer Provided

On-Premises

Raw Video

Aspera on Demand

SVG Assets

Google Cloud Platform

High-Res Media and Graphics

Microsoft Azure

Server Archives Trends 2015

amazon web services


THANK YOU
QUESTIONS?