A ~~New~~ ACS Bulk Data Transfer Service for CTA

Mauricio Araya, Leonardo Pizarro, Horst von Brand, Marcelo Jara, Rodolfo Castillo, Igor Oya, Etienne Lyard

Data Acquisition is Different in CTA

- Monte-Carlo Simulations
  - Maximum readout of 80 Gb/s
- Approximately 5 Gb/s x Camera (compression)
  - Need a highly-performant **bulk-data transfer service**

camera type	goal rate	data rate
LST	15.0 kHz	27.8 Gb/s
MST-NectarCAM	9.0 kHz	32.7 Gb/s
MST-FlashCAM	9.0 kHz	4.4 Gb/s
SST-2M-G	0.6 kHz	2.0 Gb/s
SST-2M-AS	0.6 kHz	0.07 Gb/s
SST-1M-DG	0.6 kHz	0.34 Gb/s
SCT	2.5 kHz	28.3 Gb/s

Site	Trigger Rate for Hadrons (Hz)	LST/event	MST/event	SST/event	SCT/event
CTA-South	39941	0.5421*	1.8260	0.6149	0.6523
CTA-North	17017	1.1895*	2.2048	-	-

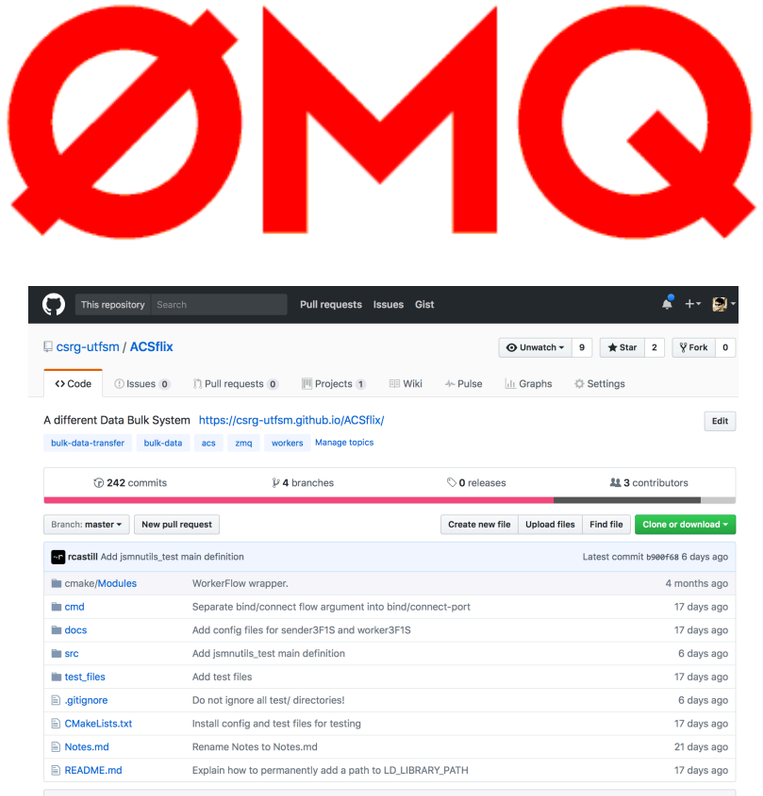
Telescope type	Pixels per camera	Window (ns)	Samples (per ns)	Bytes/ sample	Bytes for header	Bytes/ pixel
LST	1855	30	1	4	5	125
MST-NectarCAM	1855	60	1	4	5	245
MST-FlashCAM	1764	60	0.25	2	5	35
SST-2M-G	2048	100	1	2	5	205
SST-2M-AS	2048	N/A	N/A	N/A	N/A	7
SST-1M-DG	1300	100	0.25	2	5	55
SCT	11328	60	1	2	5	125

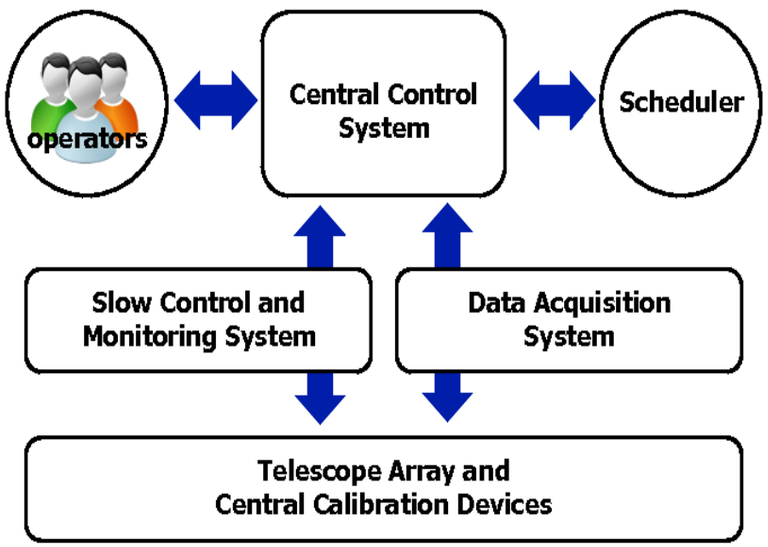
Bulk-Data Transfer Service (BDT)

- ALMA's BDT-NG service
  - Based on DDS
  - Proprietary (RTI)
  - Tailored for ALMA
- ACS Community Branch
  - No Open Source Implementation
  - CORBA-based one is deprecated
  - But IDL is defined and agreed

Bulk-Data Transfer using 0MQ (BDT-Z)

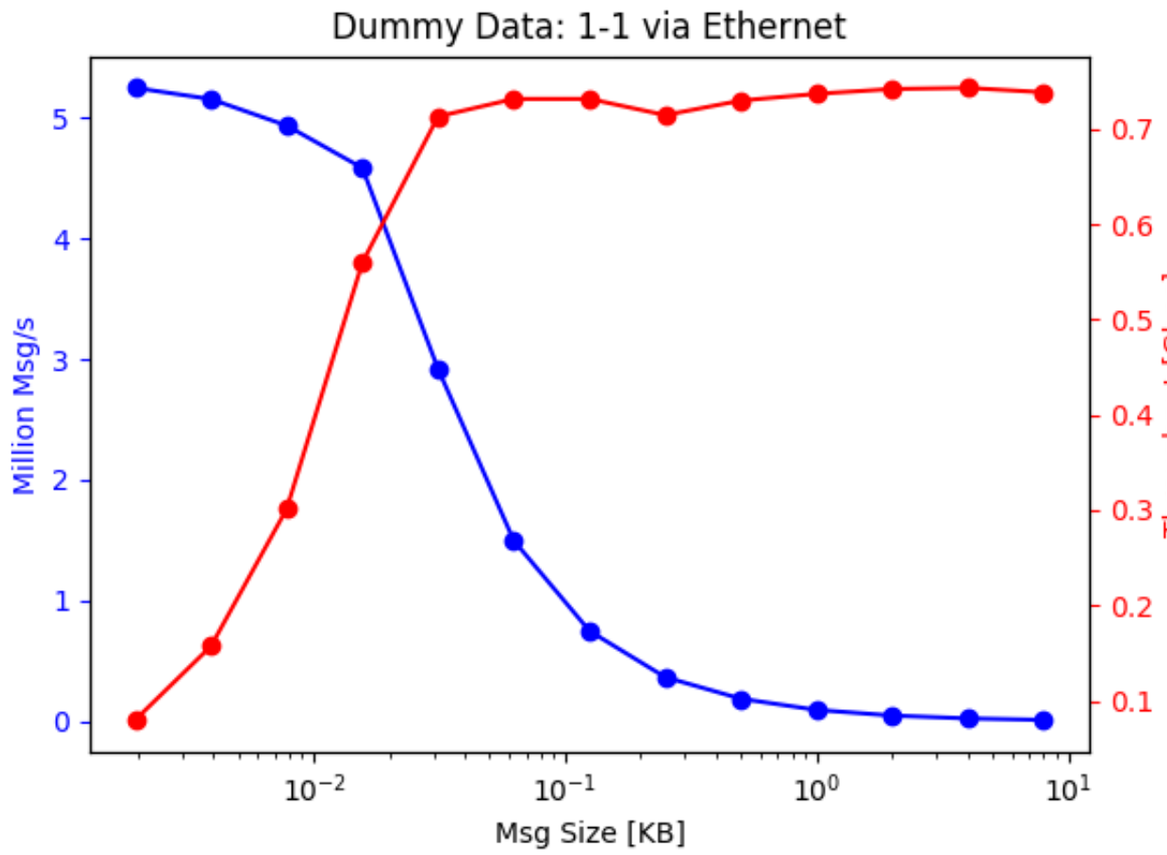
- Highlights
  - Open-source alternative for CTA
  - Independent and ACS API
    - DAQ can focus on serialization
- Implemented in C++ using 0MQ
  - **Data Transfer:** Push-pull pattern
  - **Data Control:** Publisher-subscriber





Performance

- Bulk Data Transfer
  - **Throughput** (bps) is the key
  - But not at all cost!
  - We want CPU usage to be reasonable
  - Load depends on generated **msg/s**
  - We can vary the packet size
- Dummy data over Ethernet



Performance

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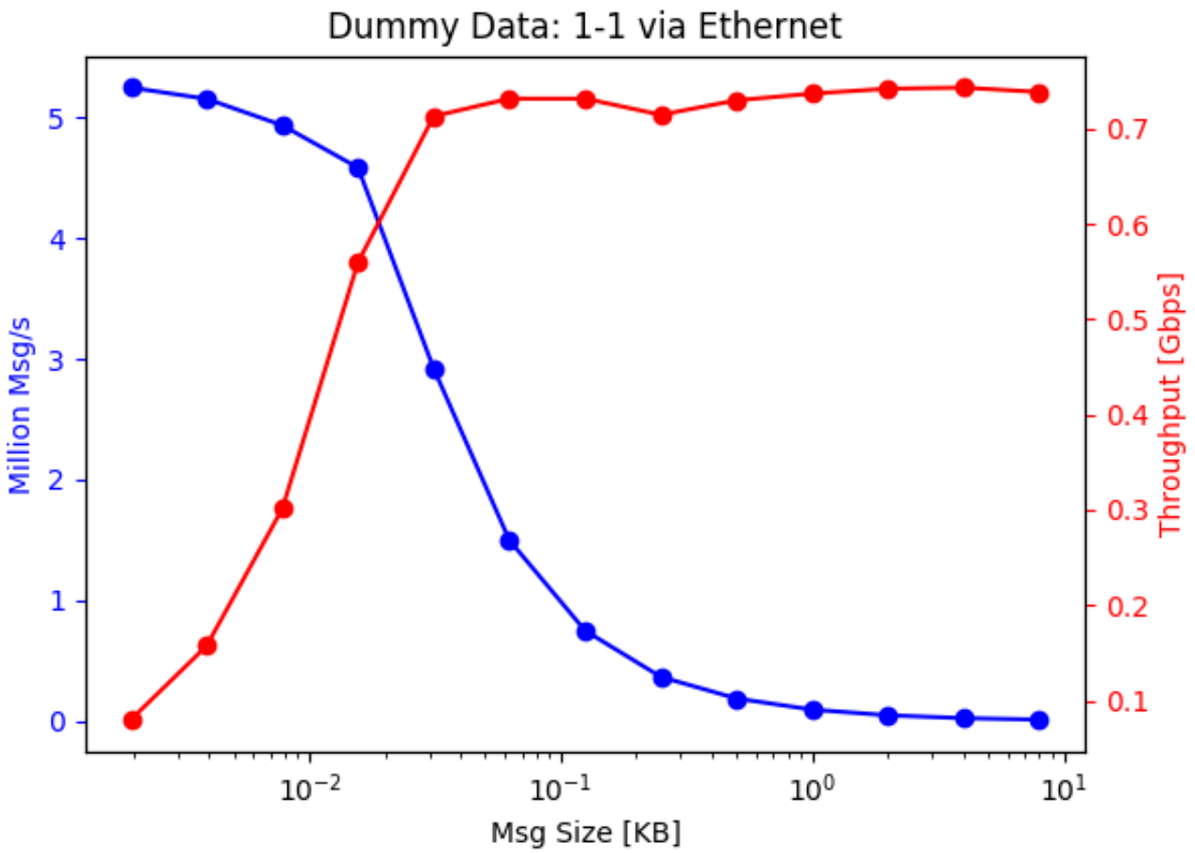
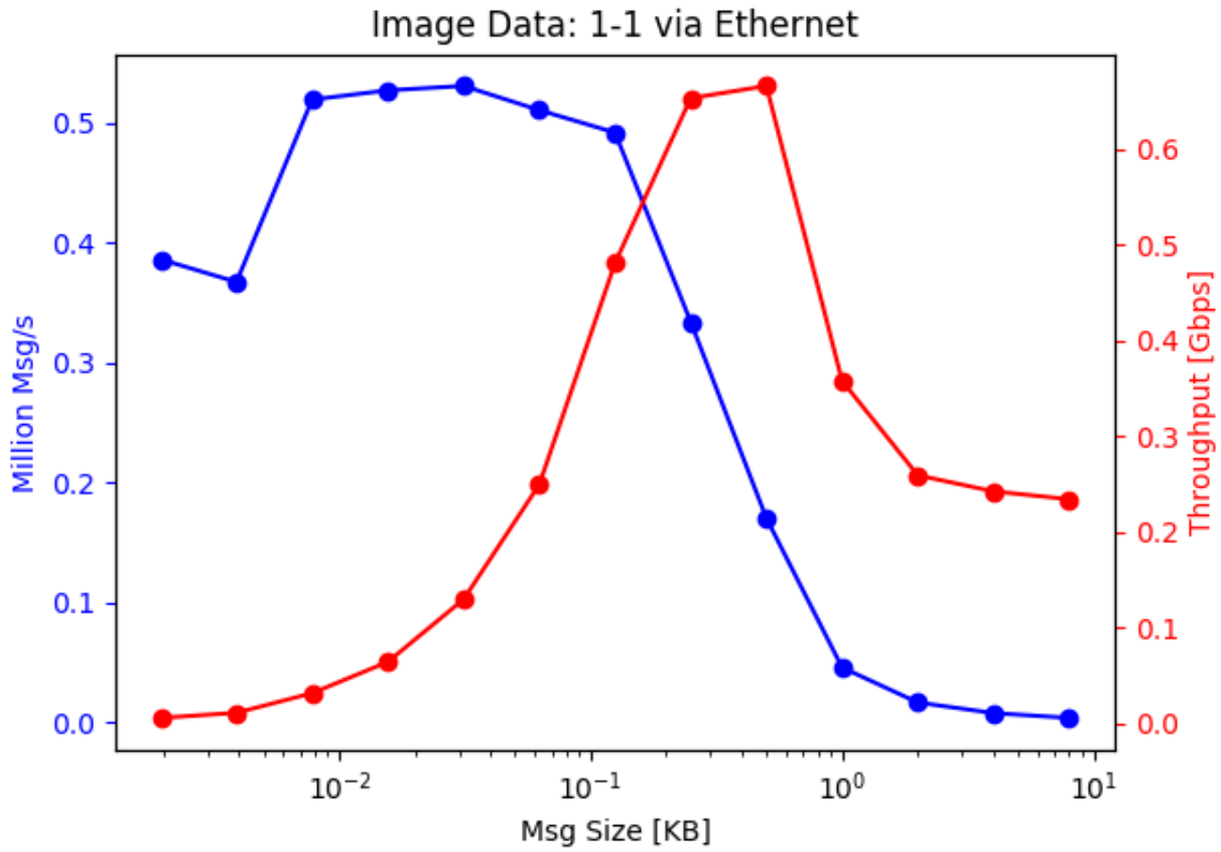


- Image data over Ethernet



Performance

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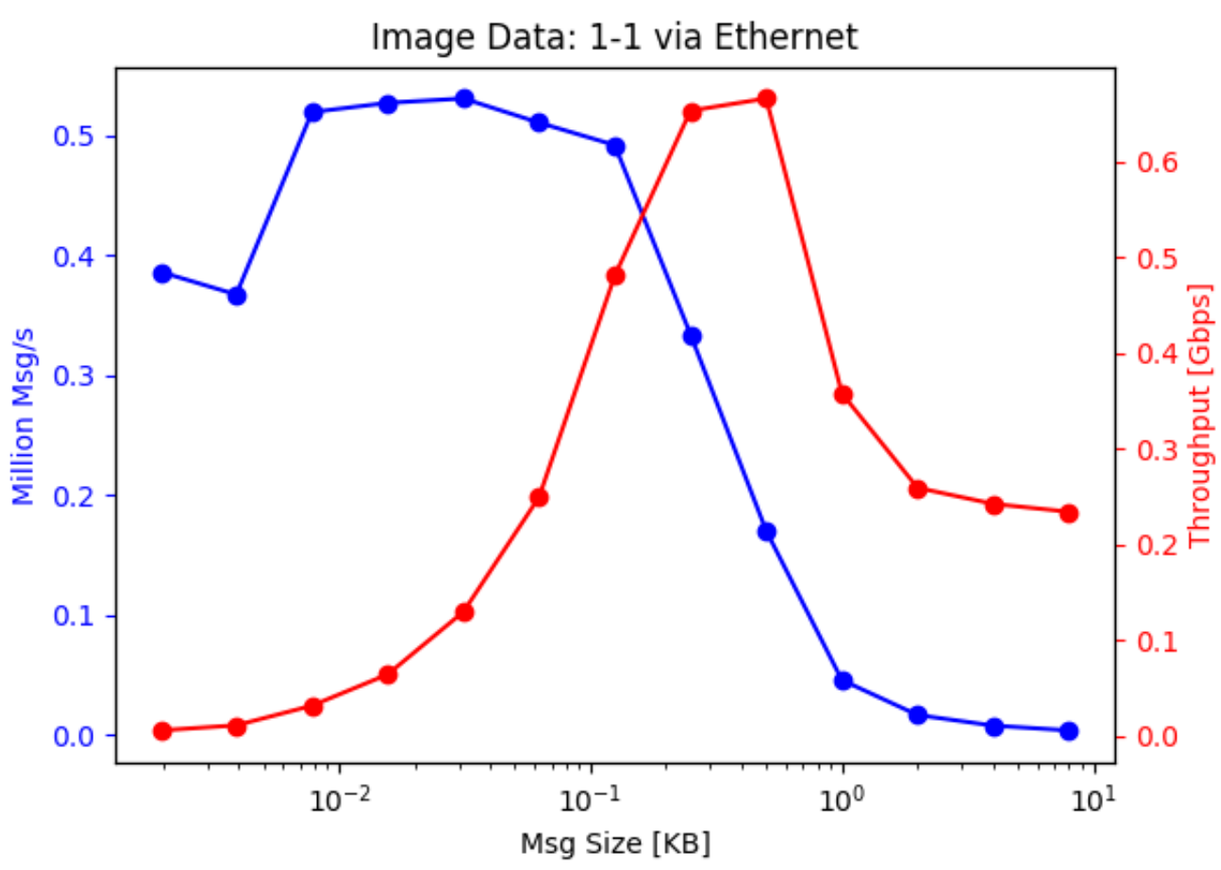
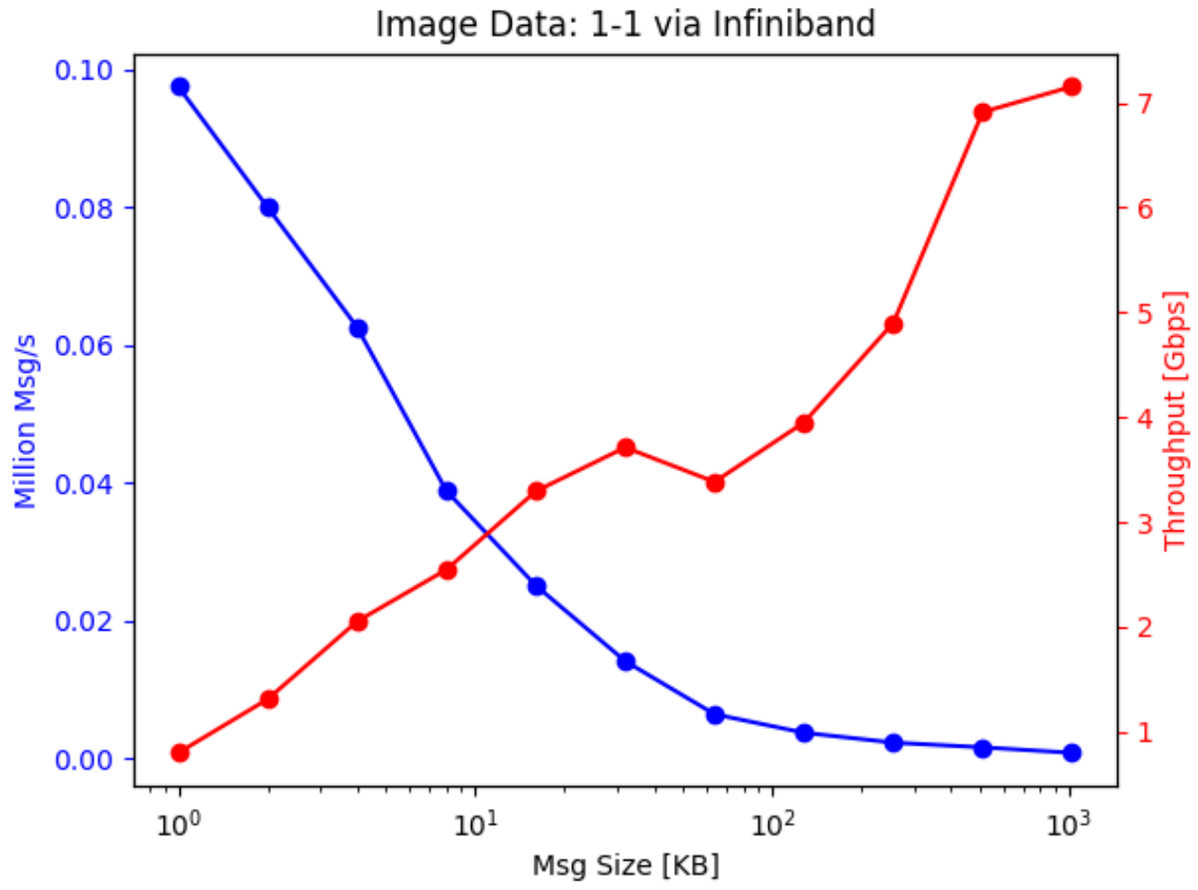


- Image data over Infiniband (1-1)



Performance

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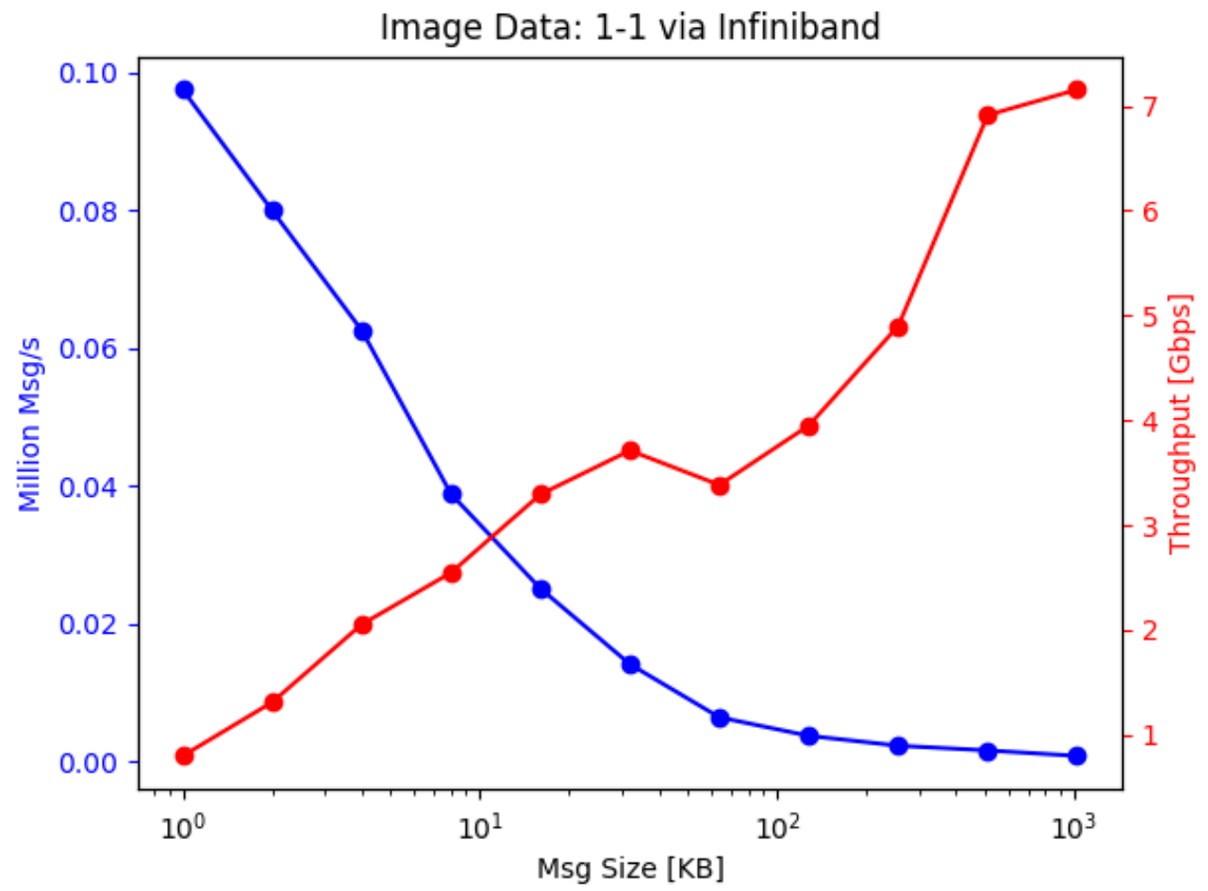
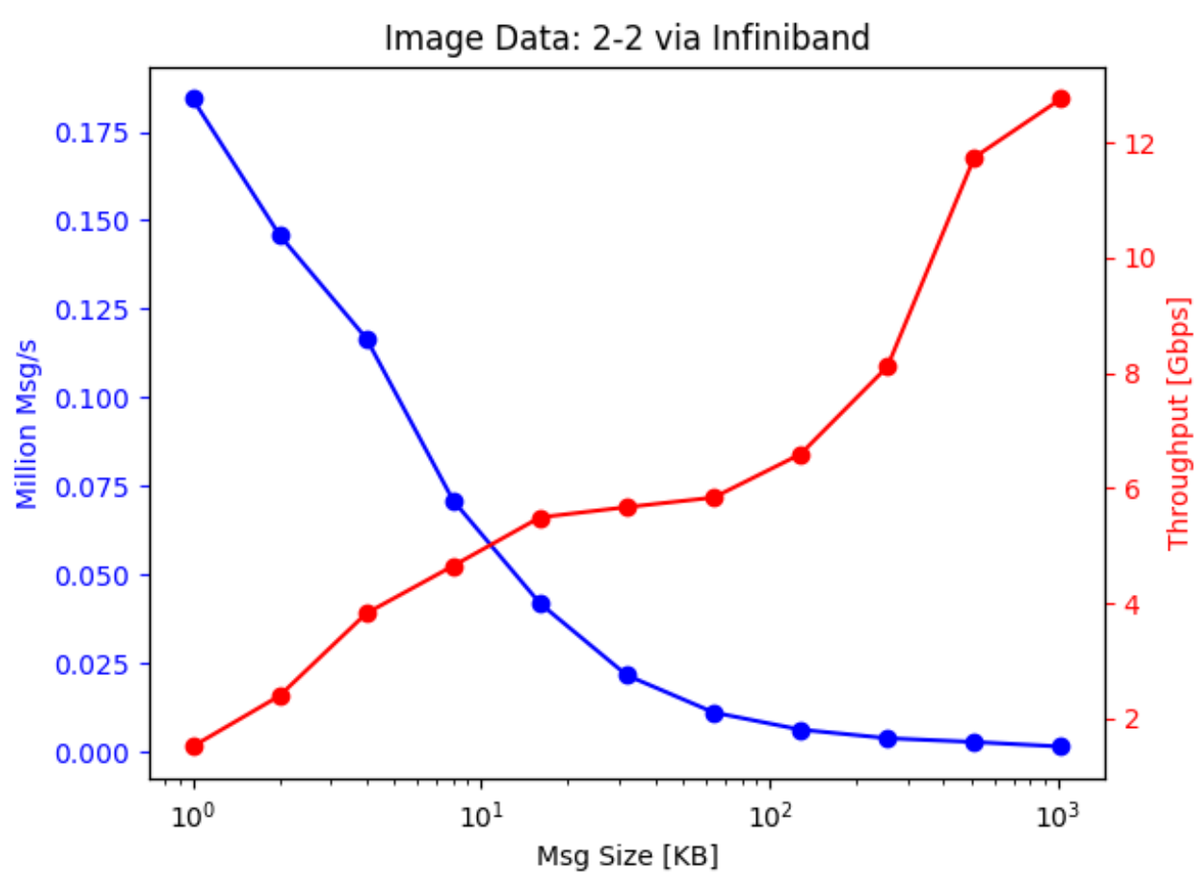
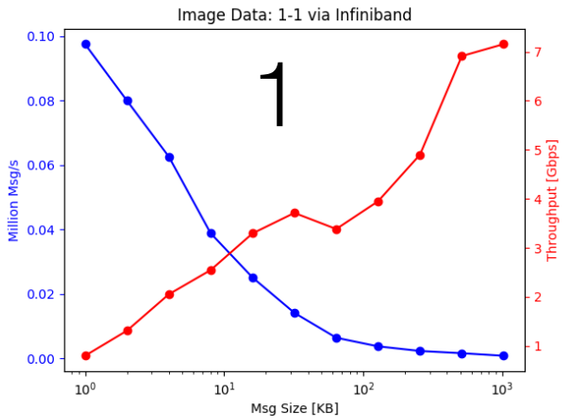
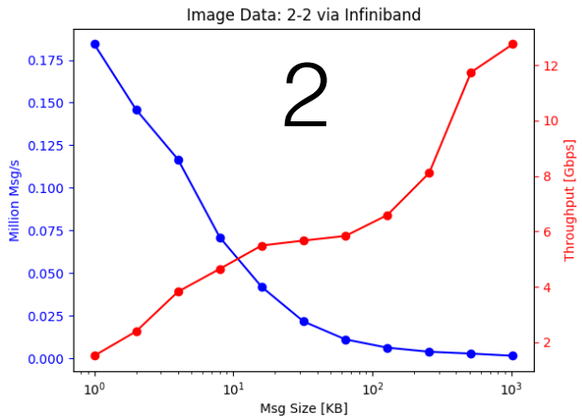


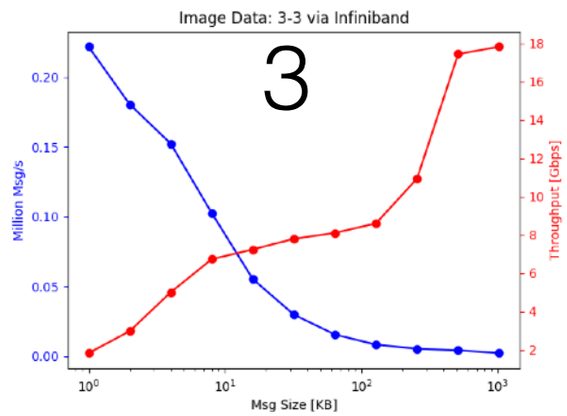
- Image data over Infiniband (2-2)

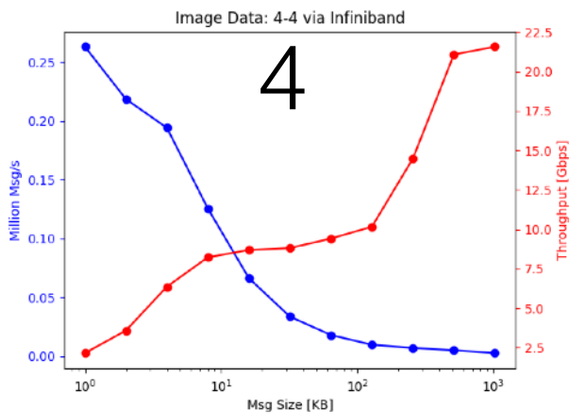


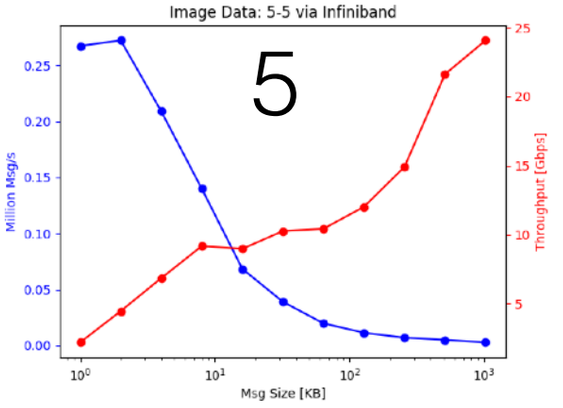
Performance

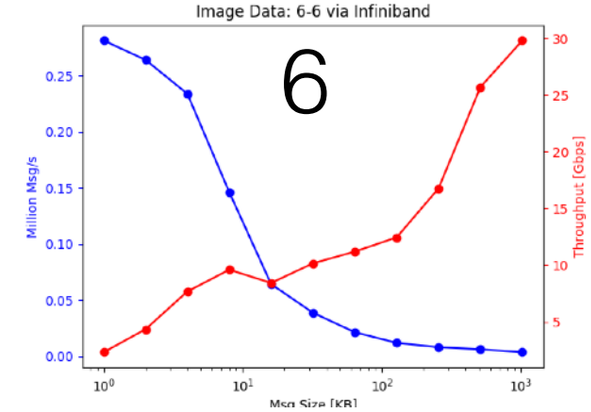


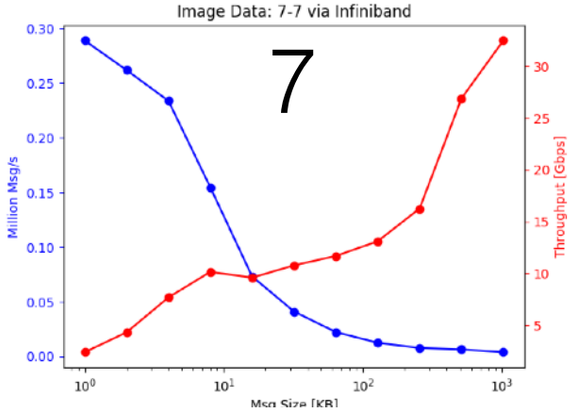


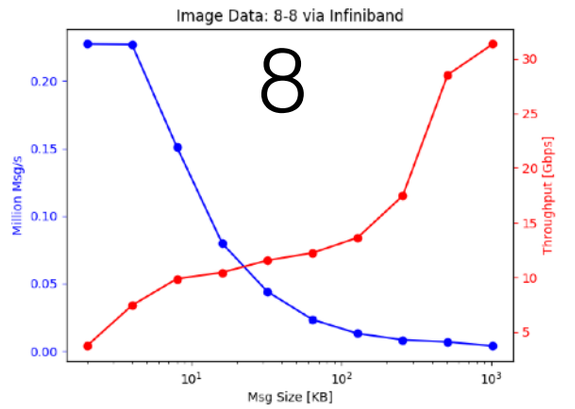


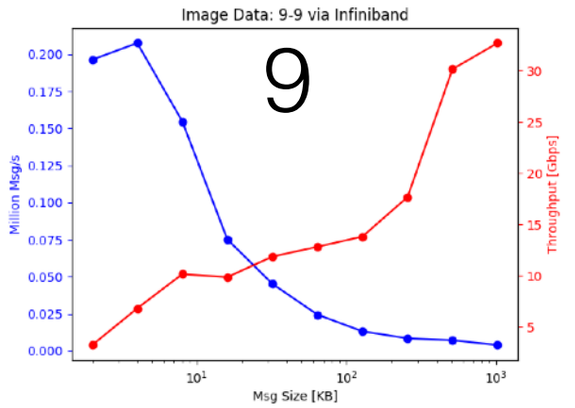


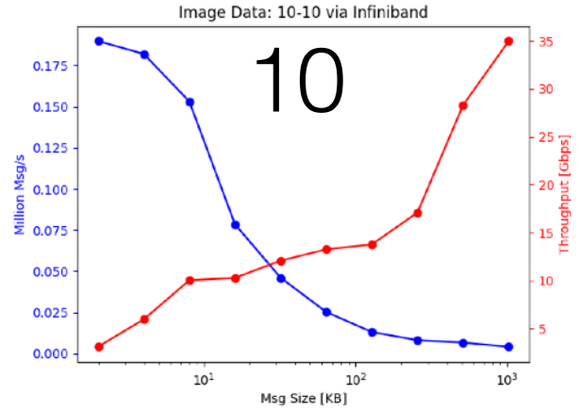


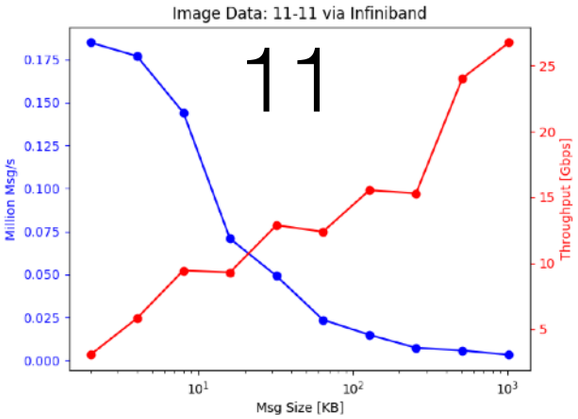


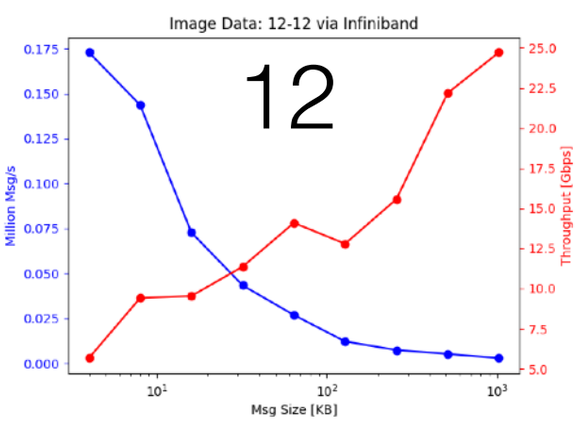




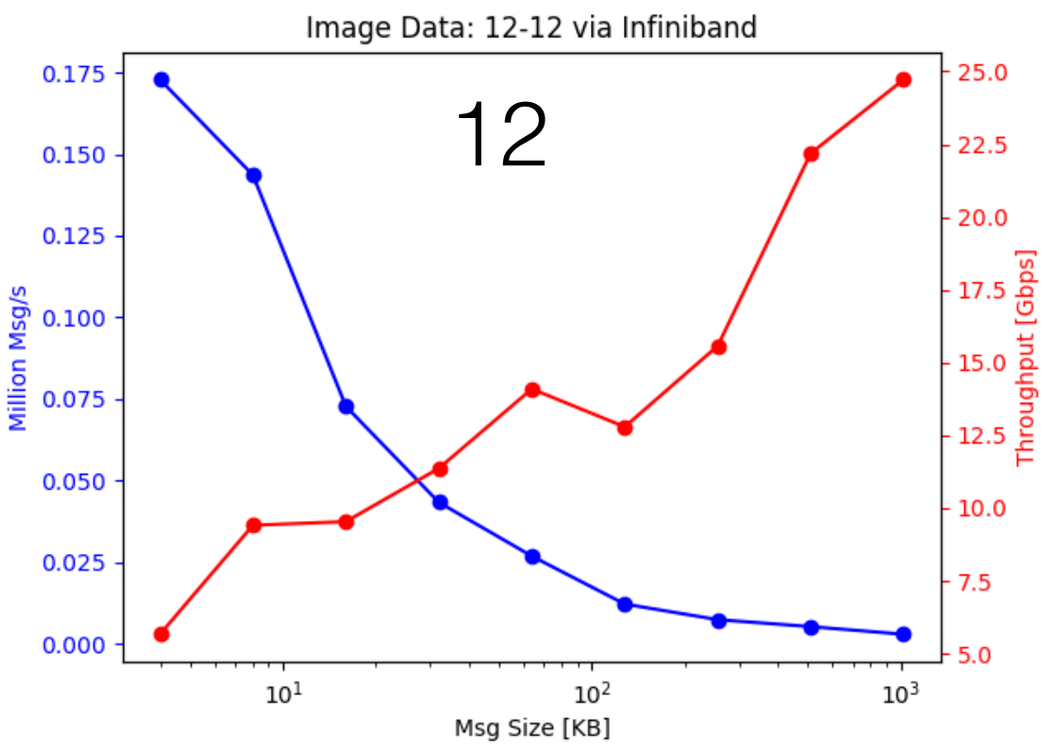


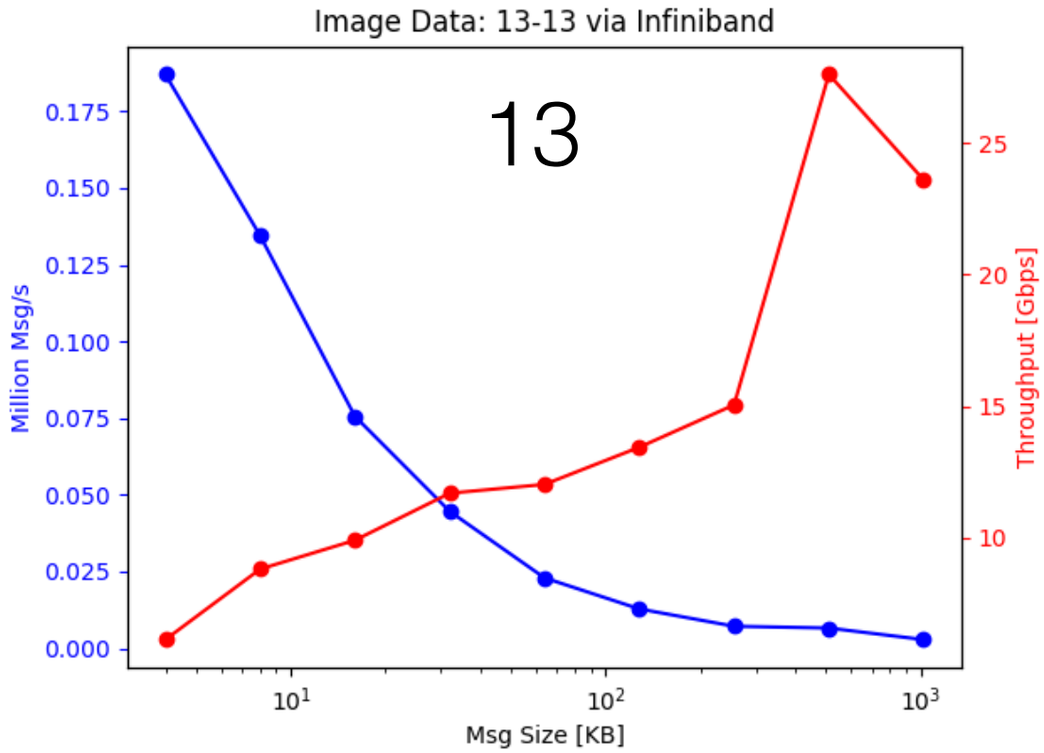






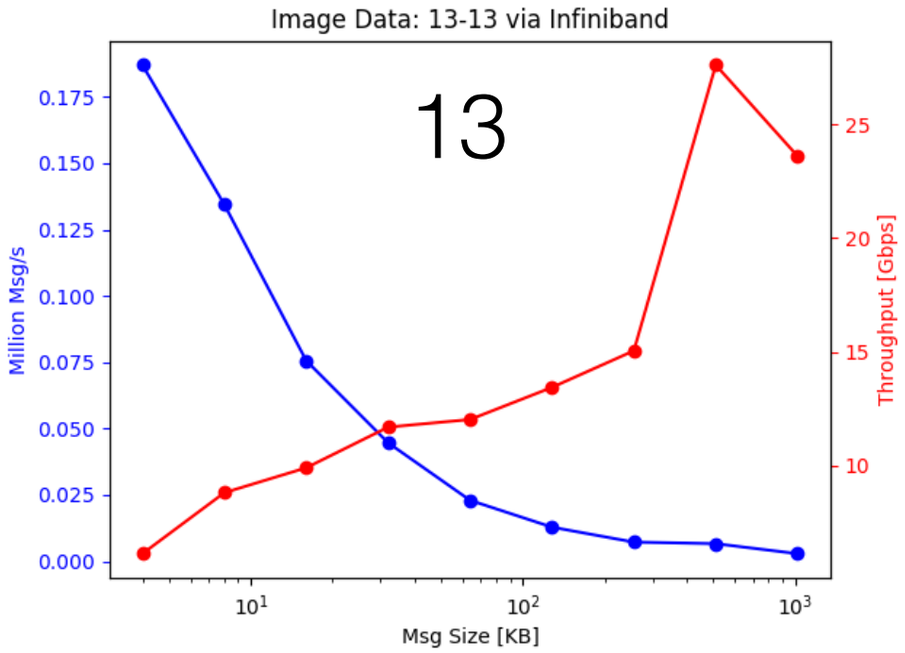
Performance

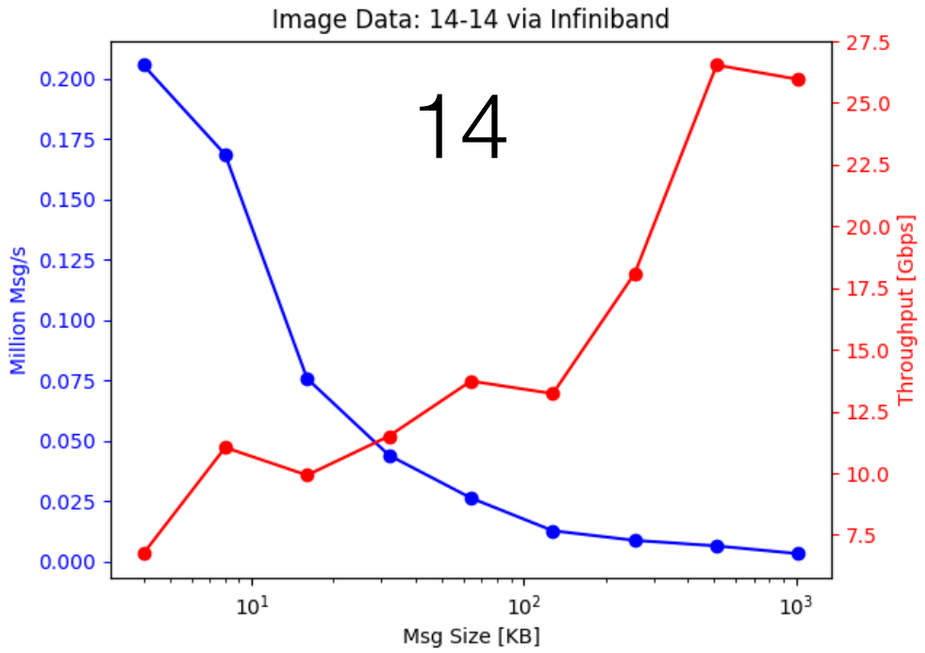


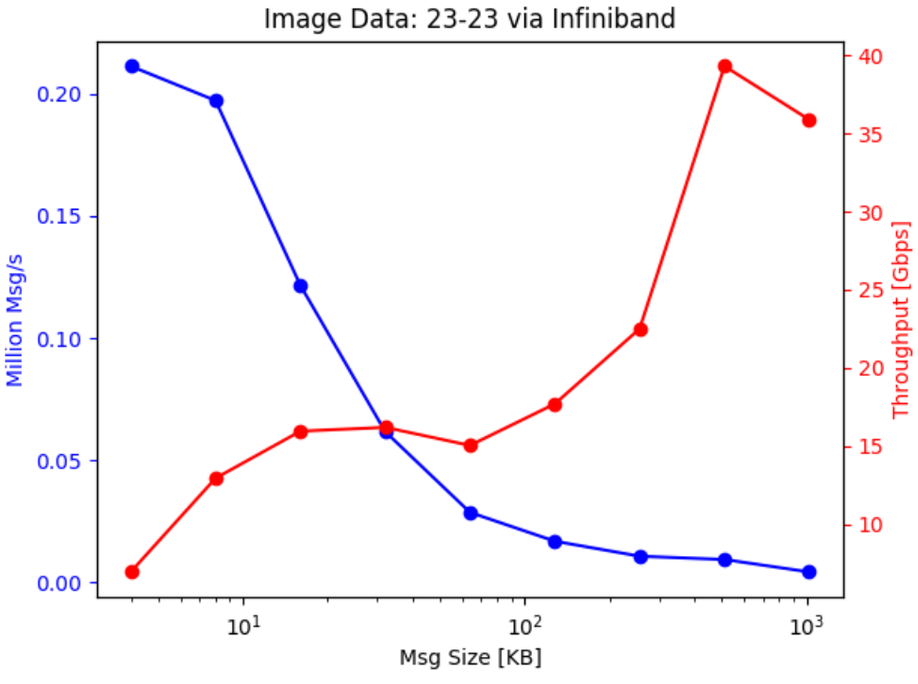


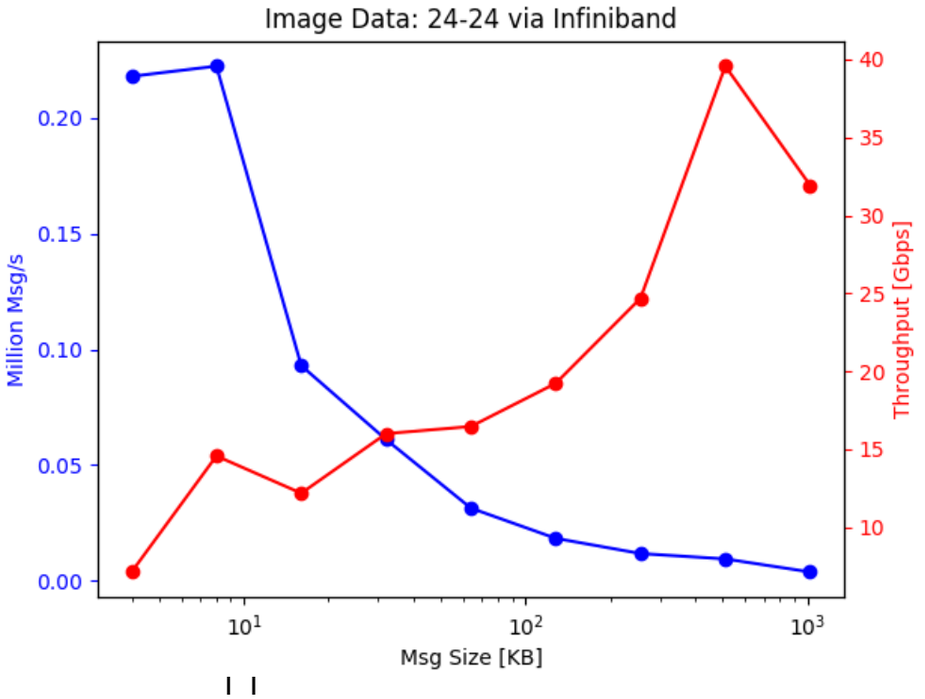
Oooops!

Performance









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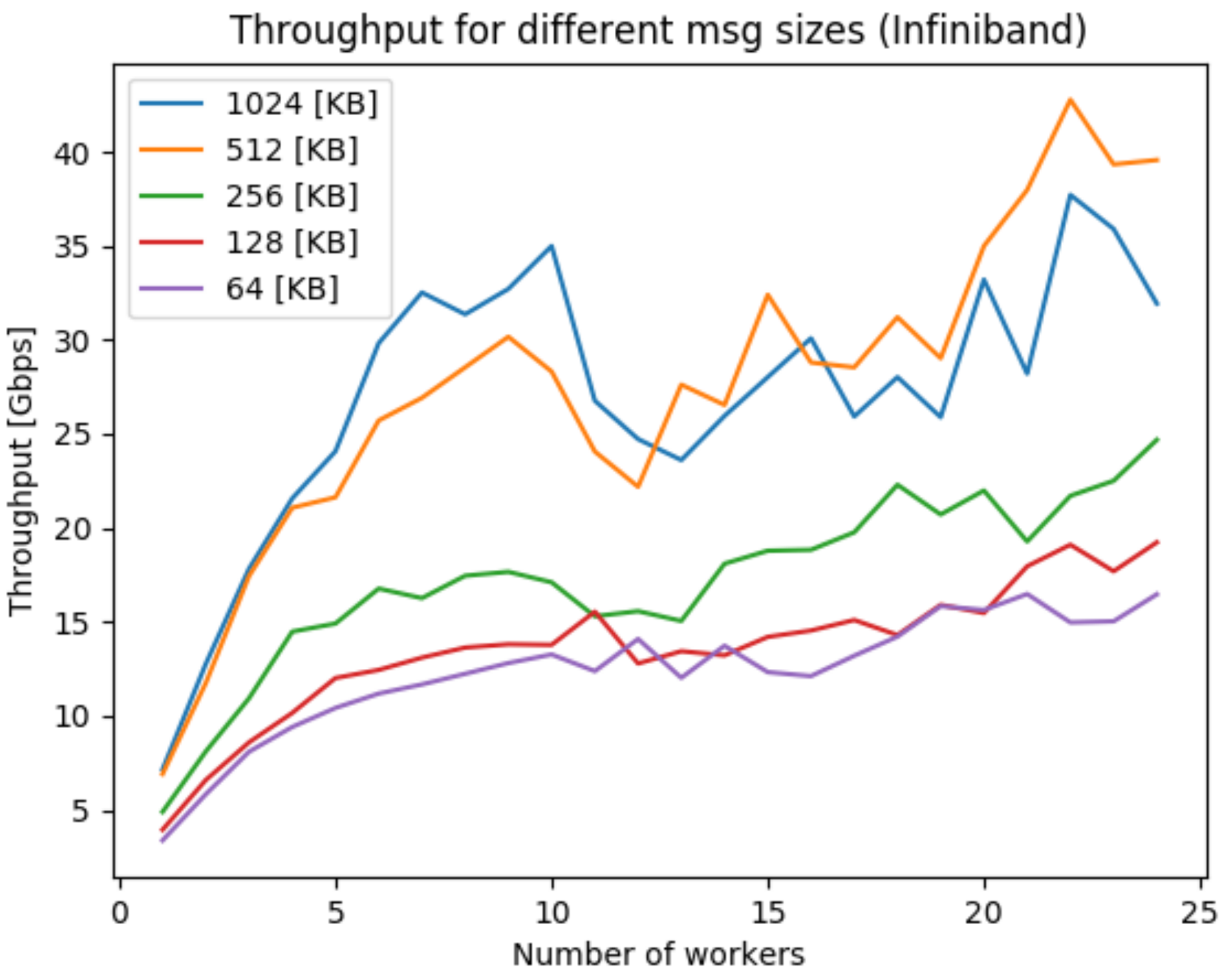

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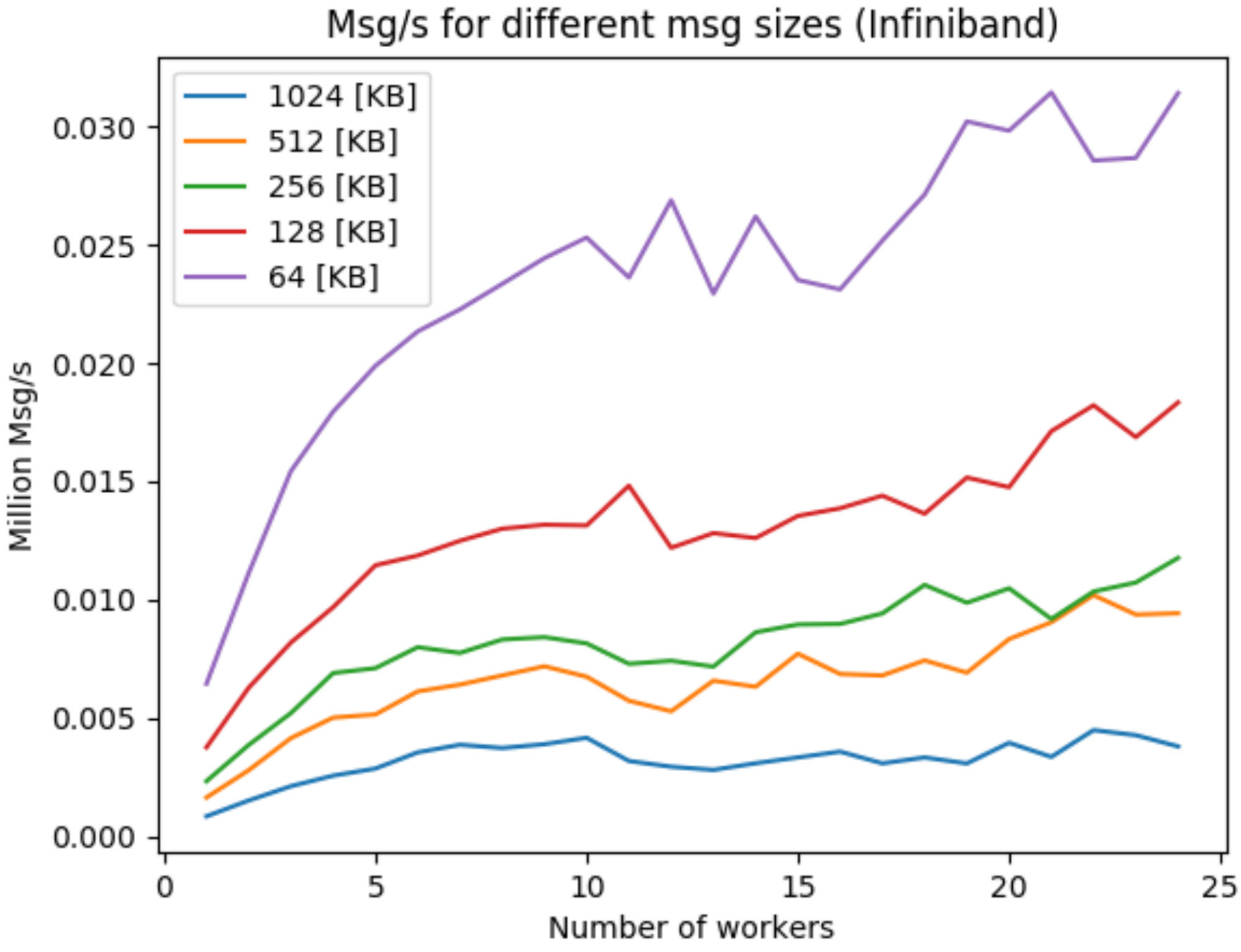
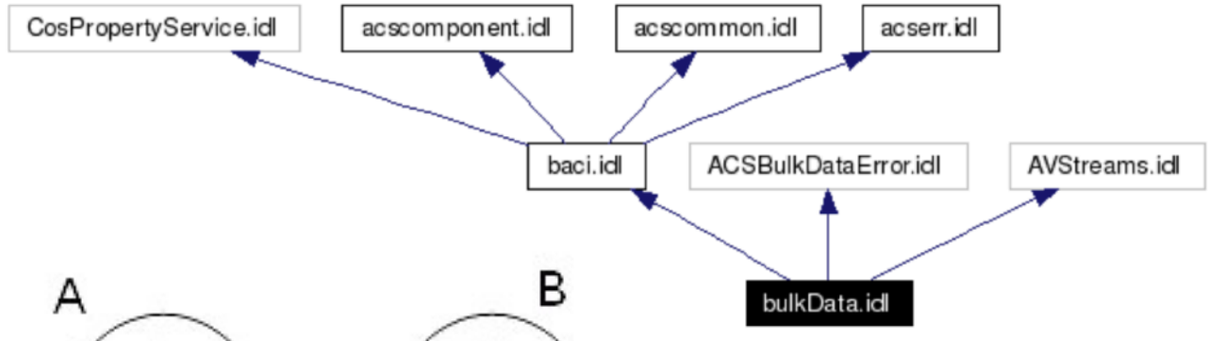
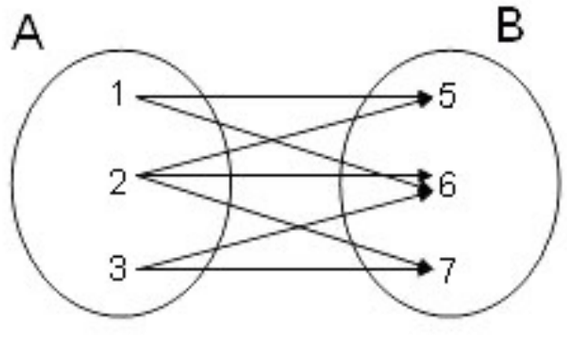


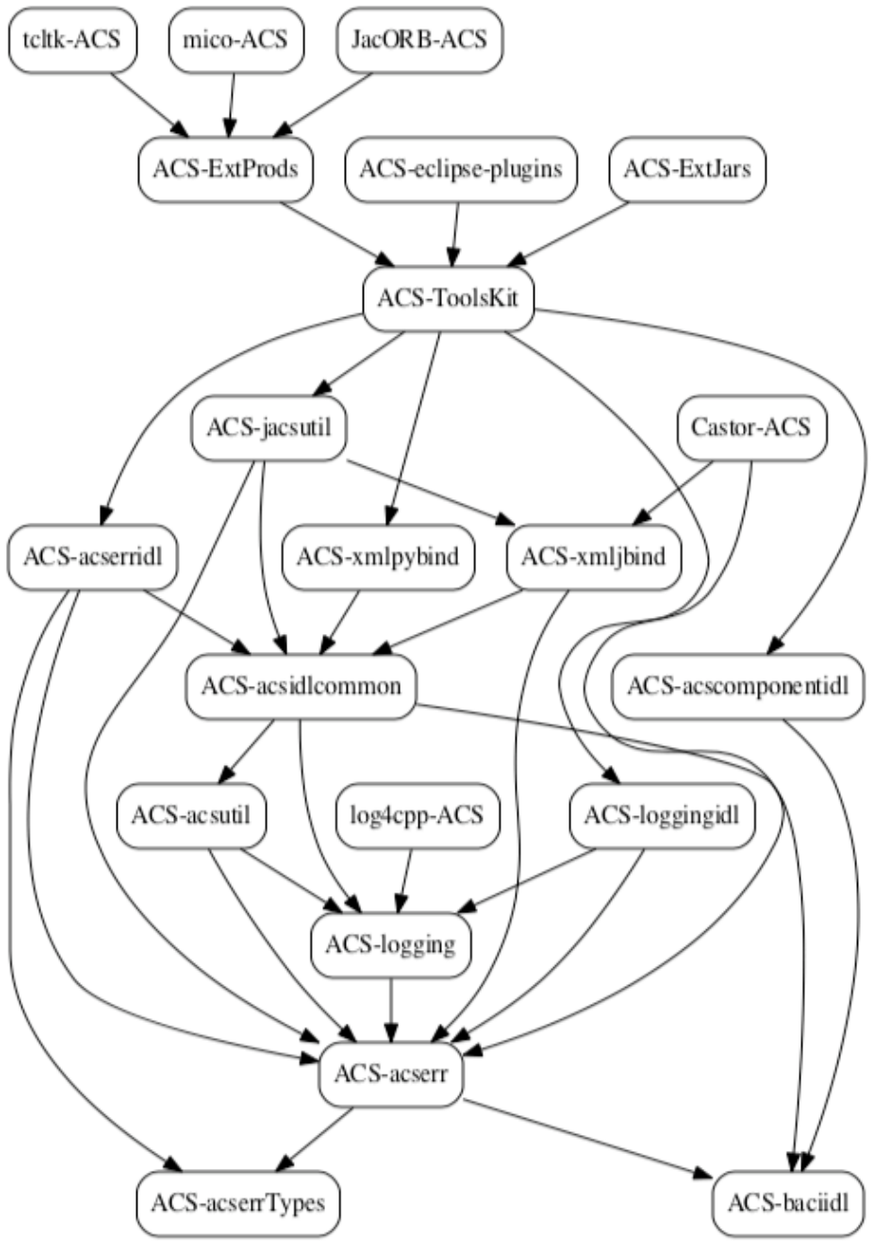
Next Steps… since 2017

- **Test ACS integration (CentOS 7)**
  - **https://github.com/LeoXDXp/ACSFlix-Python**
  - Does initial CORBA comm affect?
  - Does a larger stack affect?
- **Agree mods to BDT IDL**
- Test non-symmetric simultaneous streams
- Alternatives
  - Apache Kafka
  - HDF5 (hadoop)





Modular Packaging



CentOS 7

Search

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Index of /

Name	Last modified	Size	Description
2016.6/	15-Nov-2016 18:10	-	
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ovirt-3.6/	16-Jan-2017 12:35	-	
ovirt-36.repo	16-Jan-2017 12:54	118	
readme	05-May-2017 01:22	1.8K	

Jenkins

Jenkins

People

Build History

Credentials

Build Queue (2)

Ubuntu » ACS-Ubuntu

Centos-6 » ACS-Centosx32

Build Executor Status

master

1 Idle

2 Idle

Centos7-x64-RPM

1 Idle

ACS Community Buildfarm

Jenkins products may be found in here

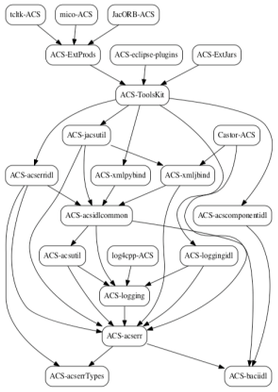
Powered by CSRG-UTFSM

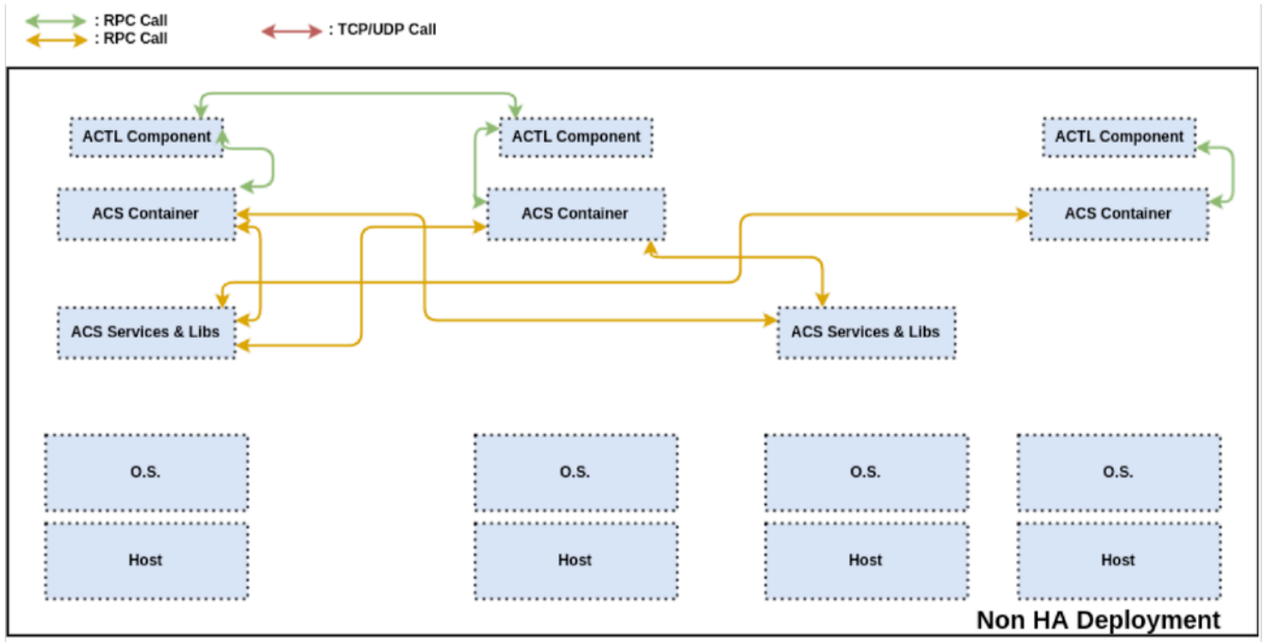
All

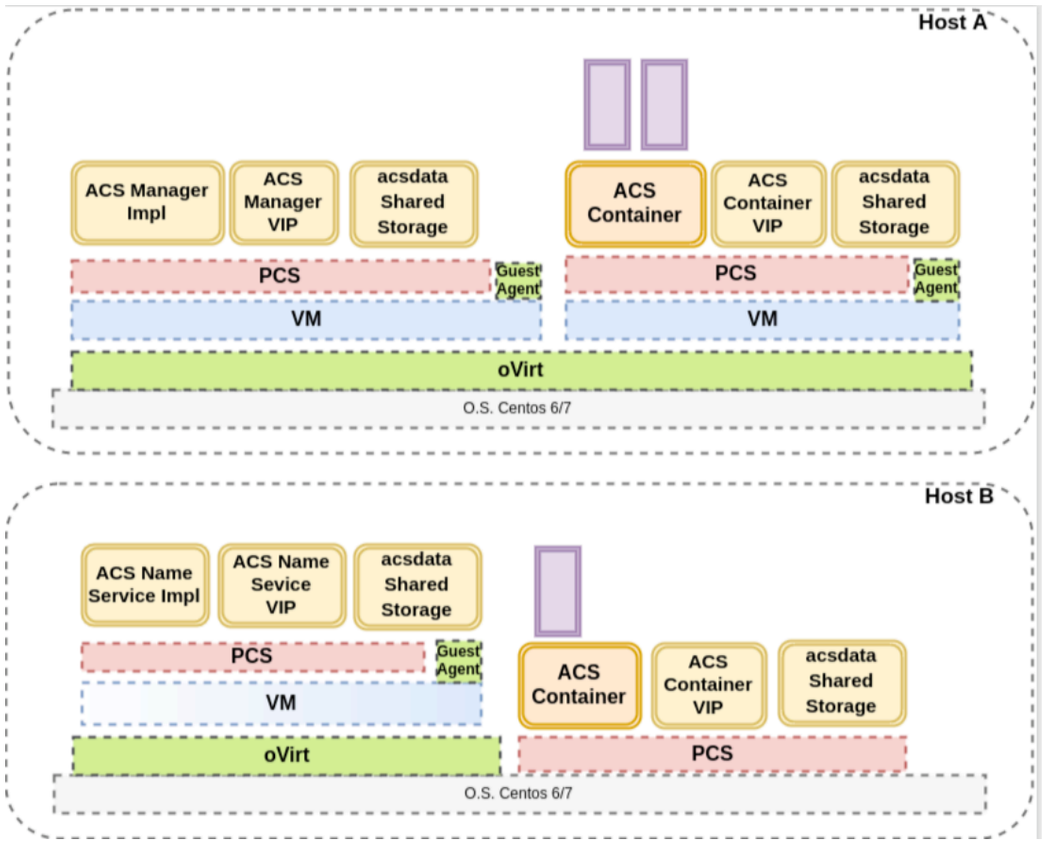
S	W	Name ↓
		ACS CentOS 7-x64 - RPMs
		ACS_Fedora25-x64 RPM
		Centos-6
		Forks
		Ubuntu

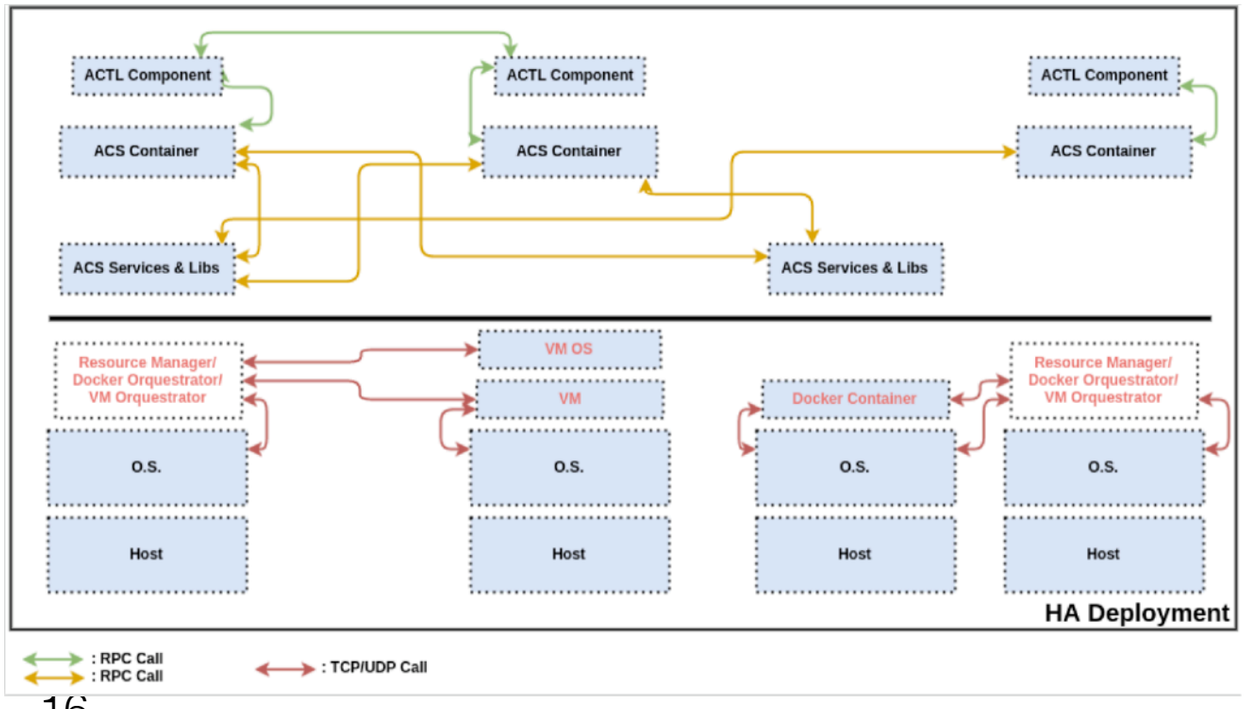
Icon: S M L

Packaging and High-Availability



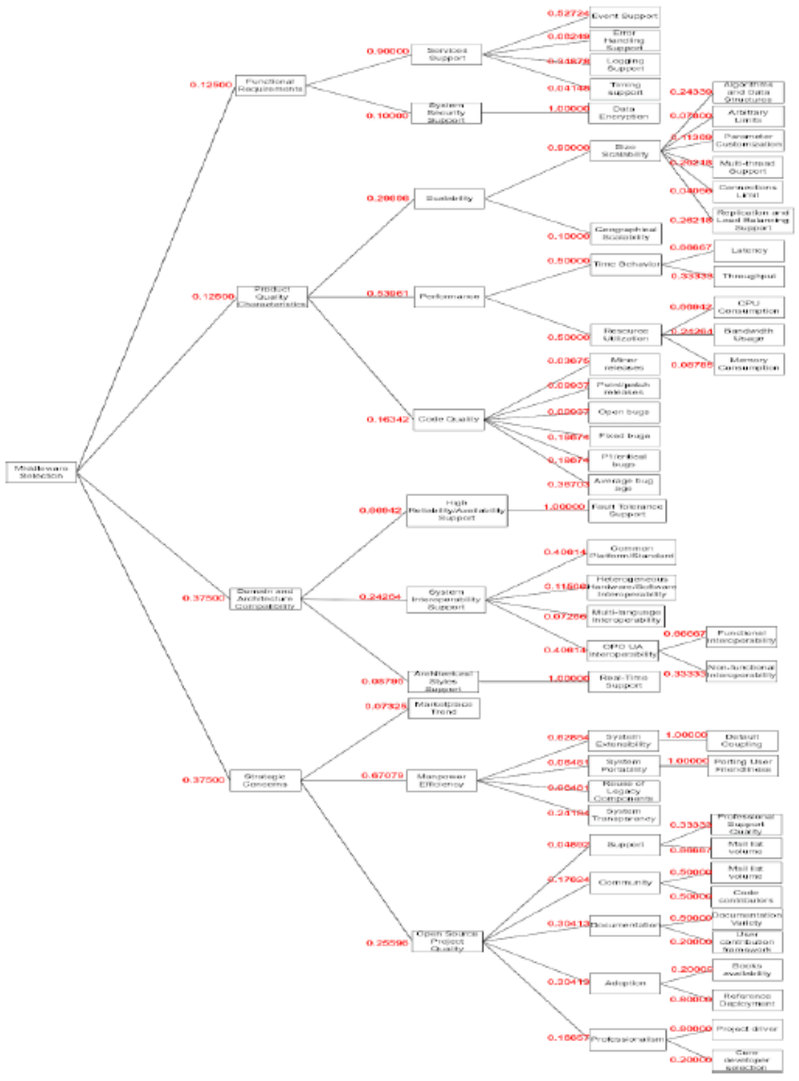






DeCORBArization

"EVALUATION OF DISTRIBUTED-SYSTEM TECHNOLOGIES FOR ALMA COMMON SOFTWARE"



RENATO FULVIO SANHUEZA ULSEN

MEMORIA PARA OPTAR AL TÍTULO DE INGENIERO CIVIL EN INFORMÁTICA

Profesor Guía: Horst H. von Brand
Profesor Correferente: Mauricio Araya

110 pages

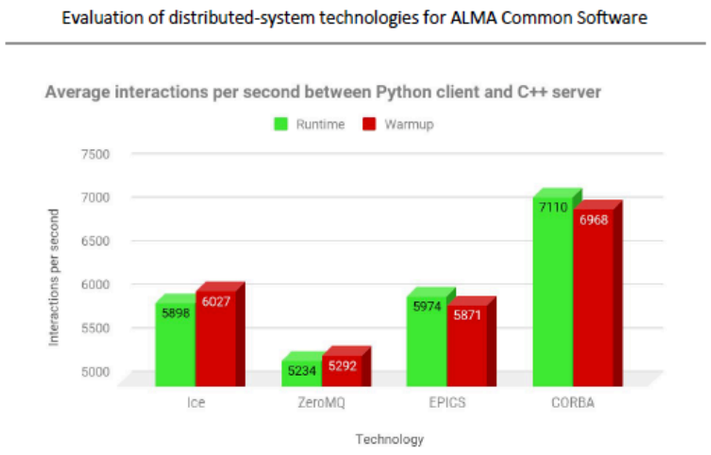


Figure 4.10: Average interactions per second between Python client and C++ server.
Source: Elaborated by the author.

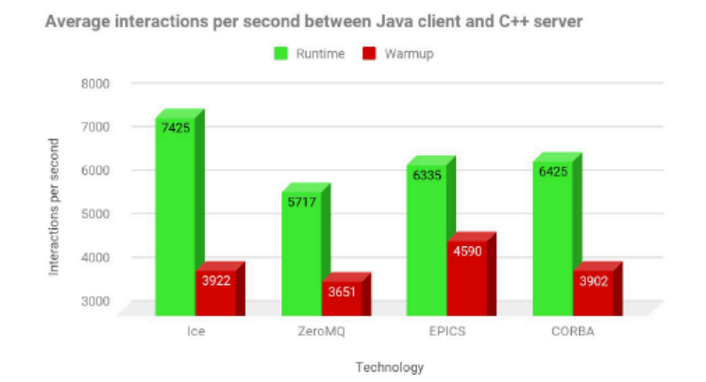
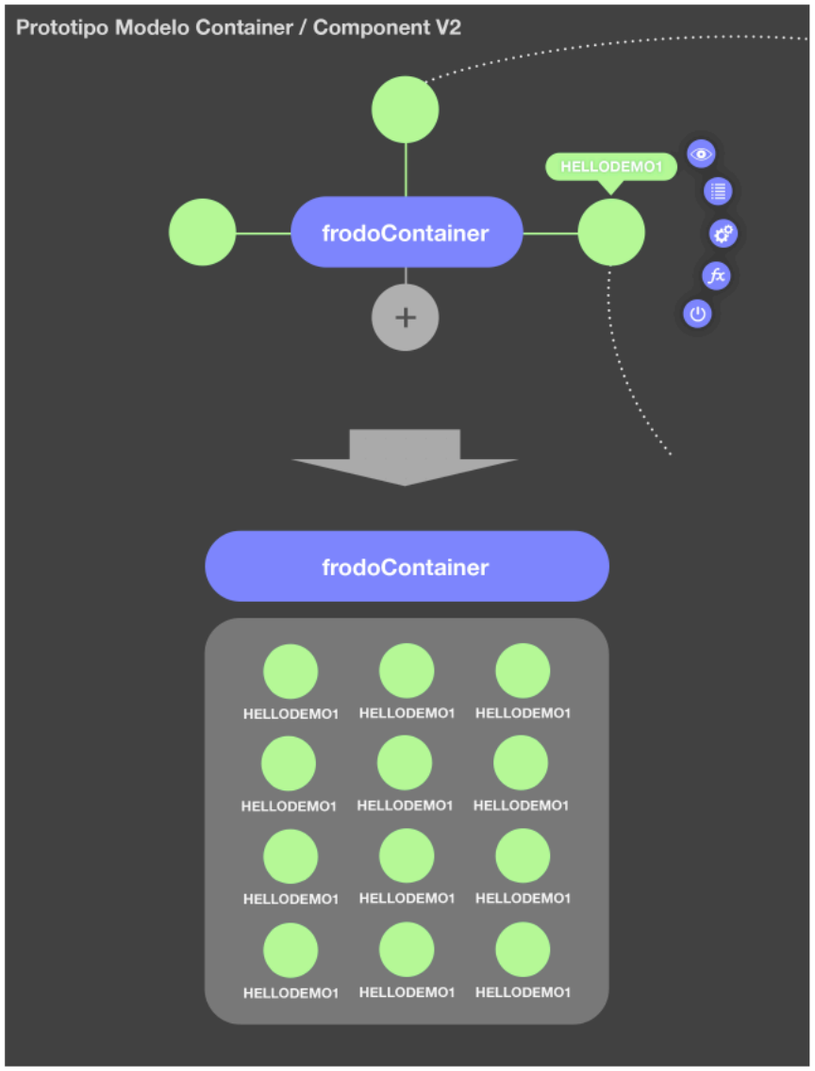
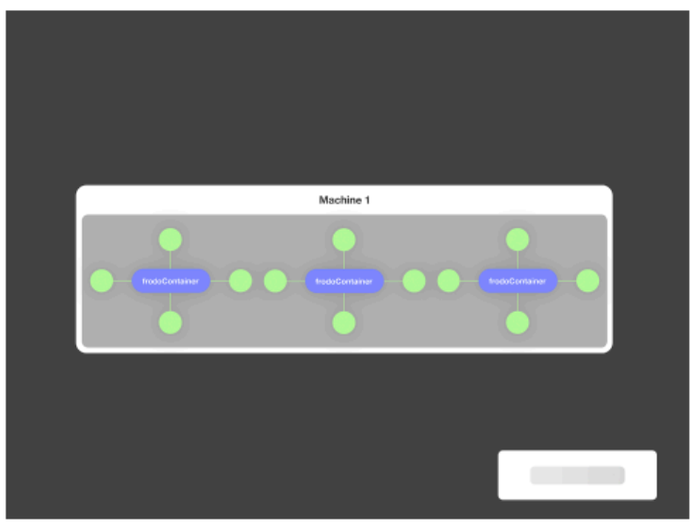


Figure 4.11: Average interactions per second between Java client and C++ server.
Source: Elaborated by the author.





"ESTUDIO APLICADO DE TECNOLOGÍAS WEB REACTIVAS PARA LA MANIPULACIÓN DE COMPONENTES DE CONTROL DISTRIBUIDO"

HERNÁN RAÚL HERREROS NIÑO

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Profesor Guía: Mauricio Araya López
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