

PHOTOGRAMMETRY and Cloud Technologies

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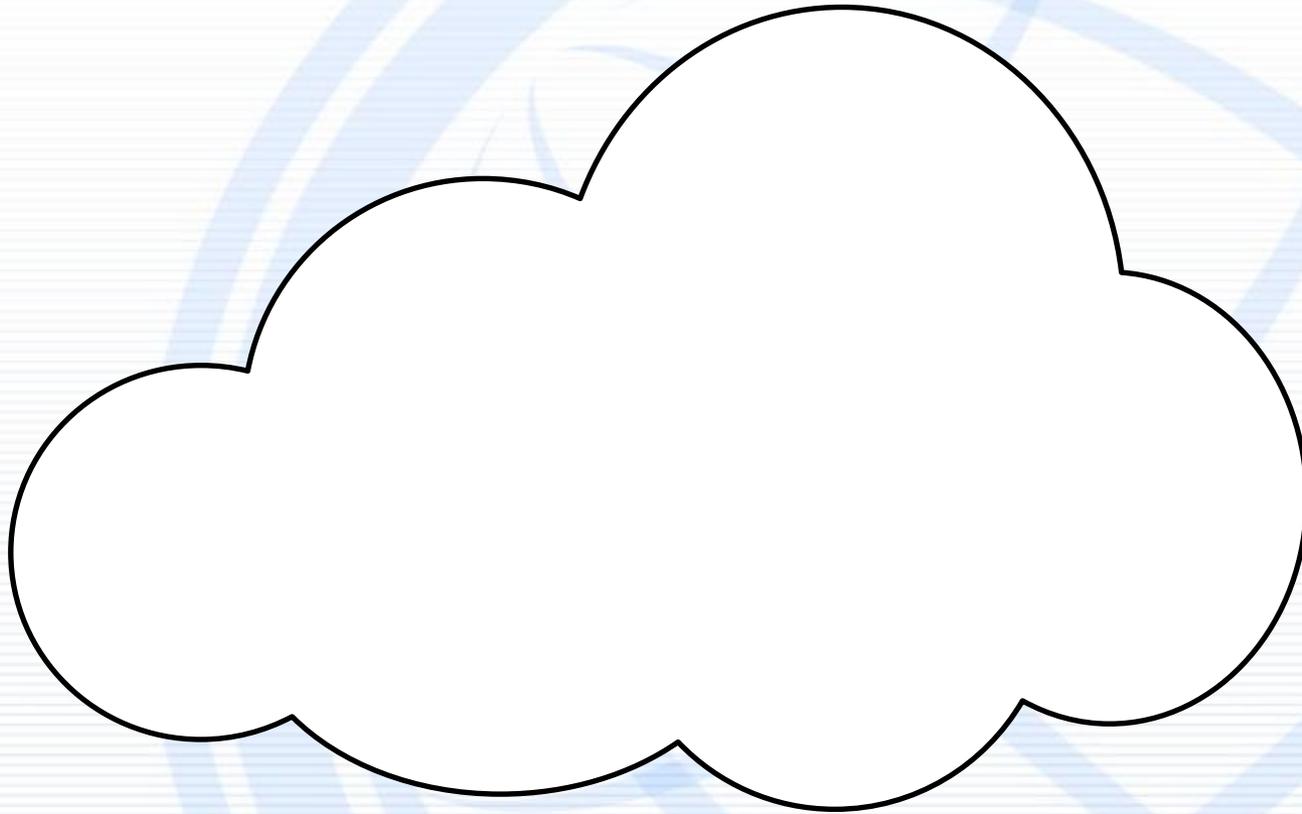
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November, 2016. Agra, India.



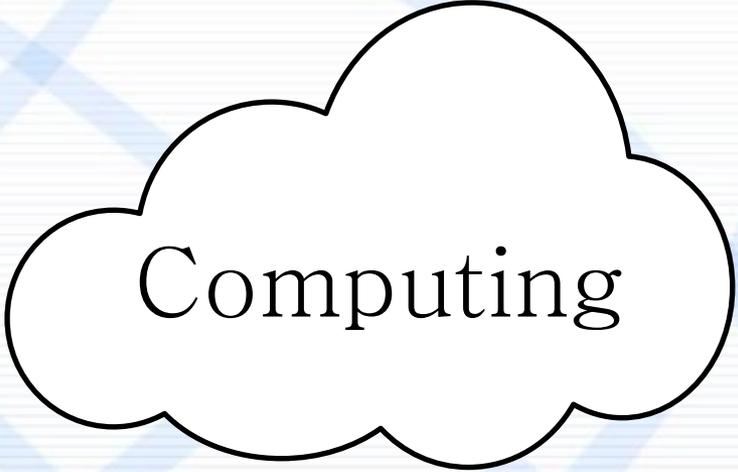
Cloud Technologies



Cloud Computing



Storage

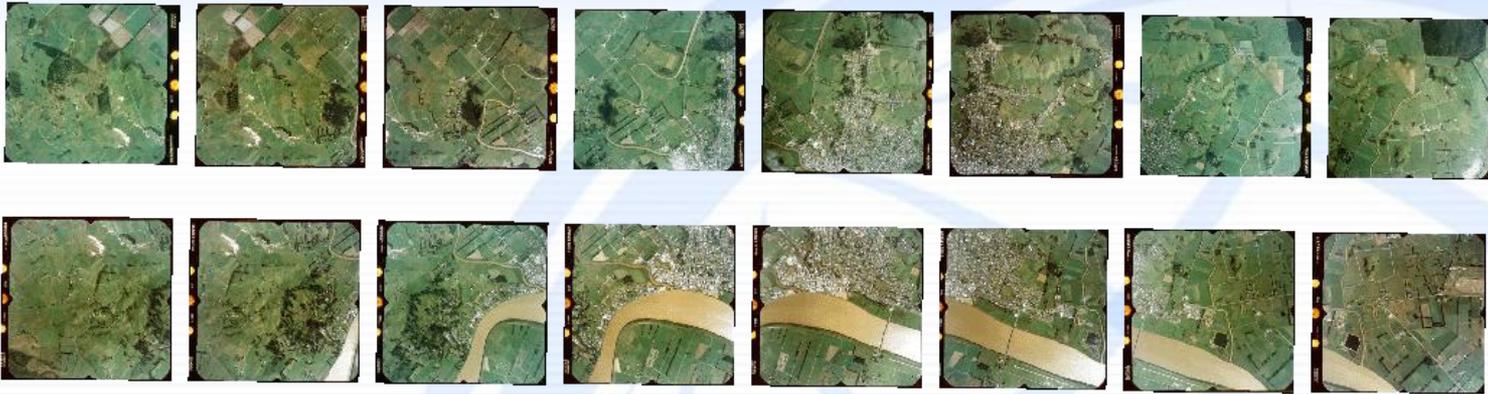


Computing



Big Data

Photogrammetric tasks



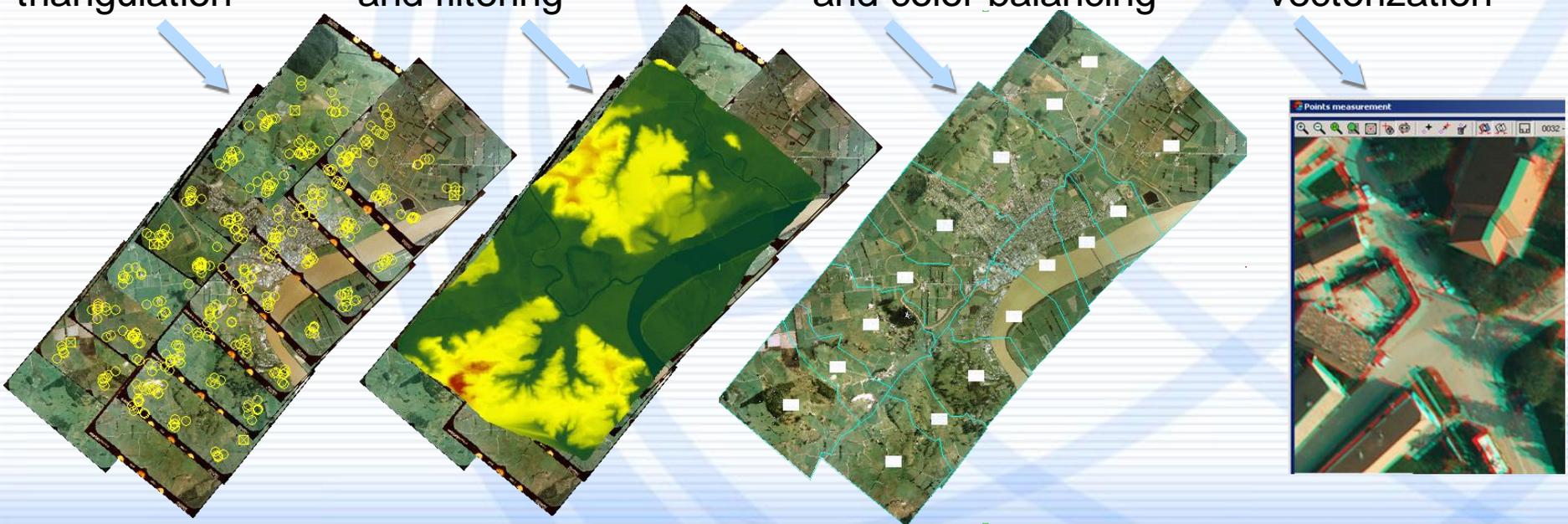
Aerial or
satellite
images

tie points + aerial
triangulation

DTM, dDSM extraction
and filtering

orthomosaic seam lines
and color balancing

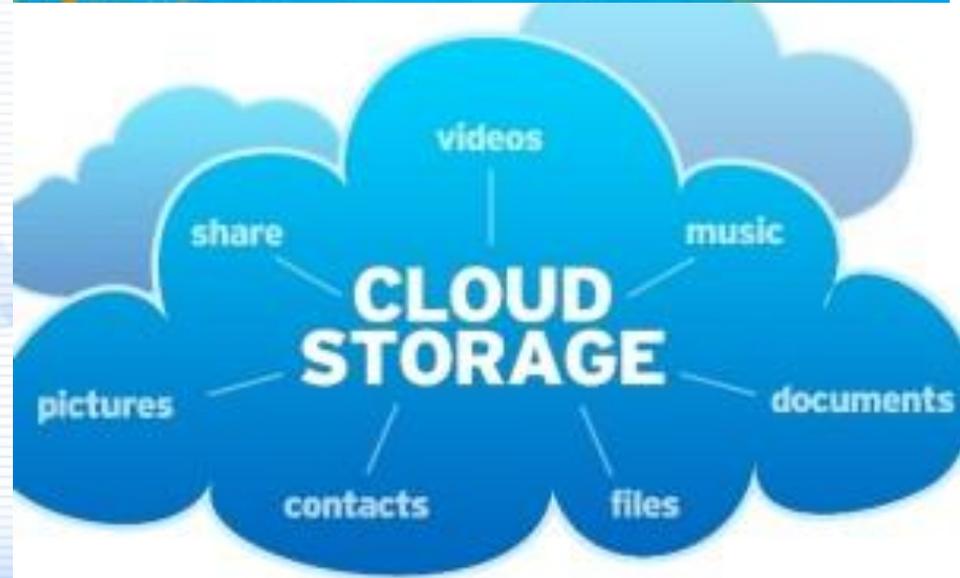
manual stereo
vectorization



Cloud Storage



ОБЛАКО@mail.ru



Cloud Storage: API



ОБЛАКО@mail.ru



Cloud Storage: Corporate Solutions



Problem of data security

Large companies can deploy there own clouds on safe servers

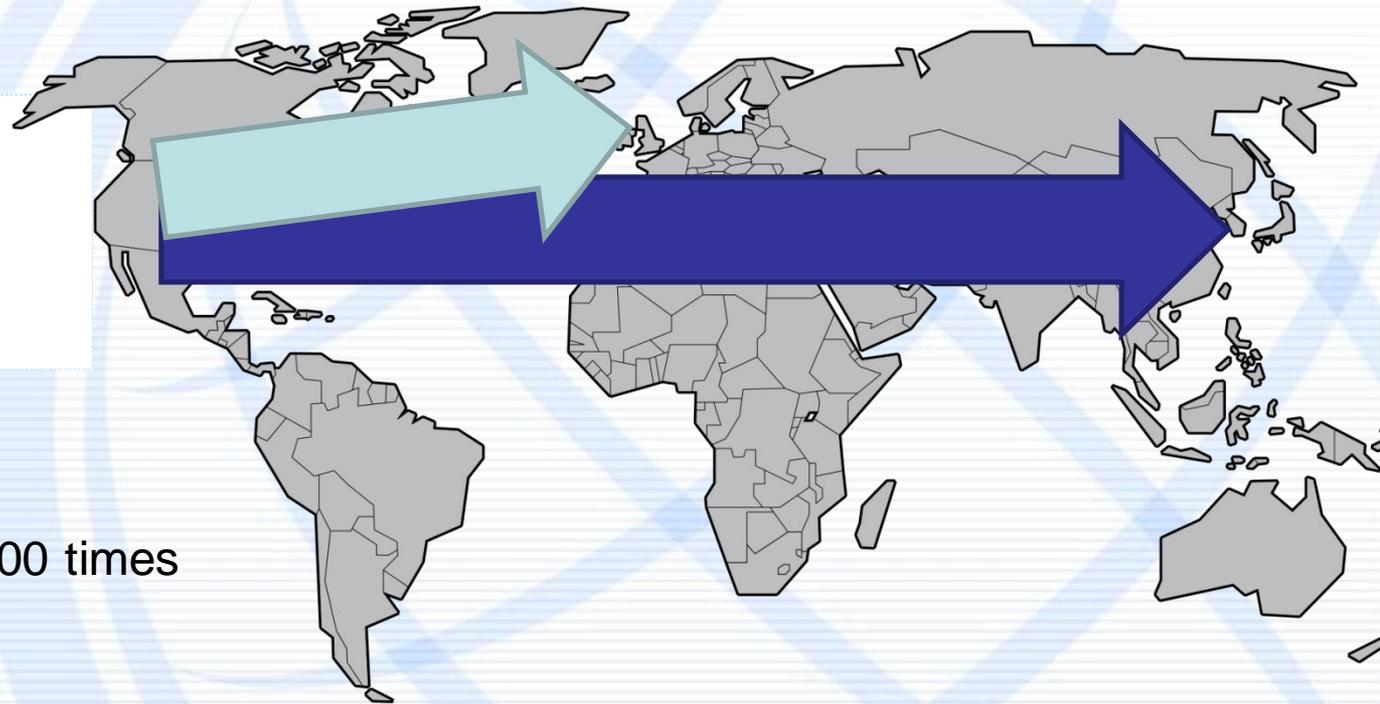


Nextcloud



PUT YOUR DATA IN ORBIT

Cloud Storage: Speed



Speed difference 30-100 times

1 month vs 7.5 hours for 1.5TB of images

Cloud Computing

Virtual computers from 5\$/month



Cloud Computing: Amazon

Virtual Computer:

40 CPU cores

60GB RAM

HDD 250GB + 100GB



Upload Speed:

600KB/s

1.5TB – 1 month to upload,

Several hours to process

No problems with PHOTOMOD usage

Cloud Computing: Space Images providers

CLOUDEO

No network access to software
(software can be controlled through the
browser)

Some organizational problems with data
access

No problems with PHOTOMOD usage


DigitalGlobe™

No REST API support in
PHOTOMOD

Not tested

Cloud Computing: Rostelecom

Virtual Computer:

Number of CPU cores – 168 (2.6 GHz),
656 GB of RAM

Disk space HDD 7000rpm - 12900GB

Disk space HDD 15000rpm - 8000GB

SSD disk space - 500GB.

Upload Speed:

6MB/s

1.5TB – 7.5 hours to upload,

Several hours to process



PHOTOMOD photogrammetric tasks:

Tie points measurements

dDSM generation

Orthorectification & ortho mosaic creation

80-100% CPU usage

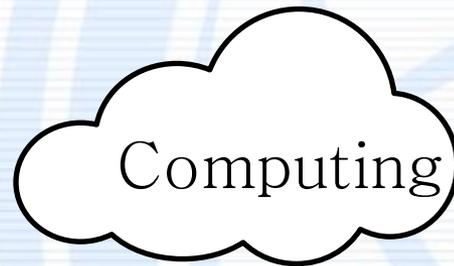
Depends on HDD speed,
SSD required

Cloud Usage: Problems to be Solved



Stereo control/measurements

Client-Server architecture



Storage & Computing located separately

Storage API support + data caching



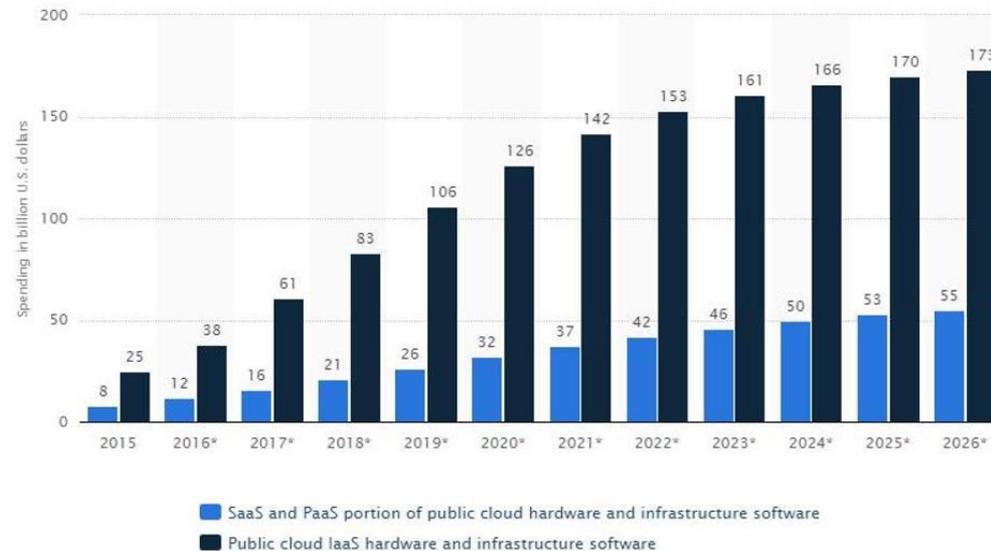
Cloud Usage: Statistics & Trends

In 2015, Amazon Web Services (AWS) generated \$7.88B in revenue with Q4 2015 up 69% over last year.

2015. Russia – services in cloud technologies showed 40% growth

300% cloud services growth is estimated in Russia in the coming years

Public cloud Infrastructure as a Service (IaaS) hardware and software spending from 2015 to 2026, by segment (in billion U.S. dollars)



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Conclusions

Cloud technologies can be successfully used for photogrammetric processing

PHOTOMOD can be effectively used in clouds

The financial benefits of using cloud technologies in photogrammetry can be based on:

- absence of requirements to have expensive hardware in the user site but depend on the cloud storage and cloud computing price;
- different price of input images when the user does not download them to his computer and processes them in the cloud of the data owner (e.g. Digital Globe proposal)

Further development of cloud technologies and services will lead to a different business model when DPW is offered as a SaaS (Software as a Service) or IaaS (Infrastructure as a Service)

Thank you for attention