fragmentiX

QUANTUM AGE CYBERSECURITY

Quick Introduction
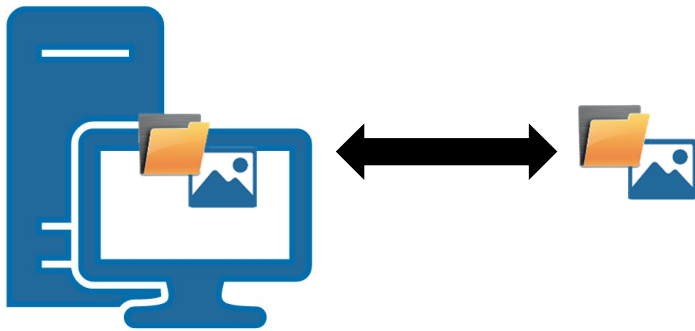
fragmentiX Technology in a Nutshell
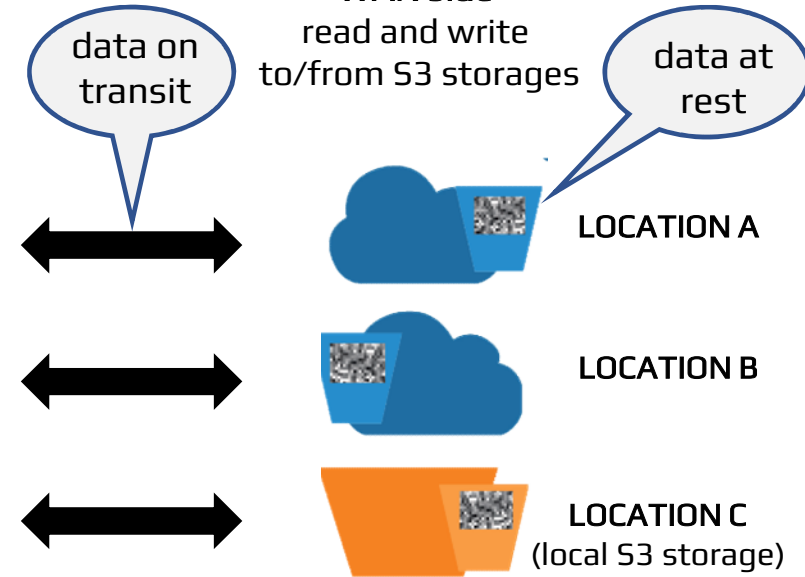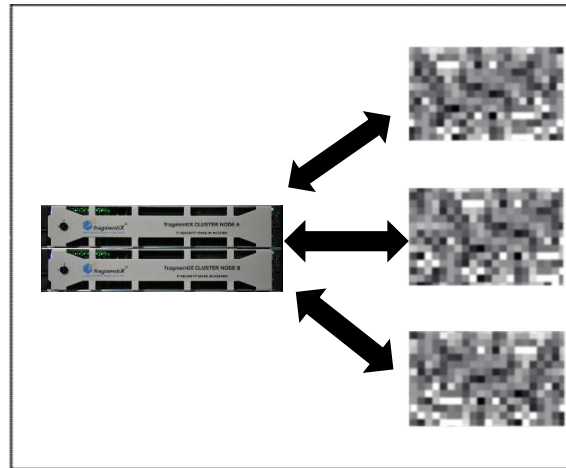
fragmentiX®
QUANTUM AGE CYBERSECURITY

LAN / user side:
fragmentiX desktop client software or WebDAV-provided network drives under Windows, MacOS and Linux
or acts as an S3 proxy for applications using S3 directly

fragmentiX Secret Sharing Appliance

data on transit

WAN side
read and write to/from S3 storages

data at rest

LOCATION A

LOCATION B

LOCATION C
(local S3 storage)

Files are saved on a fragmentiX network drive or on a virtual S3 storage

The fragmentiX appliance uses Secret Sharing algorithms to split the data into fragments

Each fragment is assigned to a separate physical storage location in a hybrid/multi cloud

Digital Sovereignty is Our Passion

> We at fragmentiX are convinced that every individual human being,
> every company of any size as well as every state has the right
> to achieve Digital Sovereignty.
>
> As an Austrian, European, and Global IT company, we want to ensure
> that every citizen, every company can effectively protect their knowledge
> and data against the effects of asymmetric hybrid warfare,
> data theft and industrial espionage.

Werner Strasser
CEO, fragmentiX Storage Solutions GmbH, Austria
Chairman of the Board of Directors, fragmentiX Schweiz AG, Switzerland

Selected fragmentiX Cutting-Edge Projects

Austria

EU

Global

… + other ministries

CVSTAR

…

Cloud storage risks – Governments

As the US CLOUD Act (Clarifying Lawful Overseas Use of Data Act), country-specific governments may pass into law the right to access data stored by cloud providers having their infrastructure on their territory, or by cloud providers having their companies incorporated under their jurisdiction, even operating overseas.
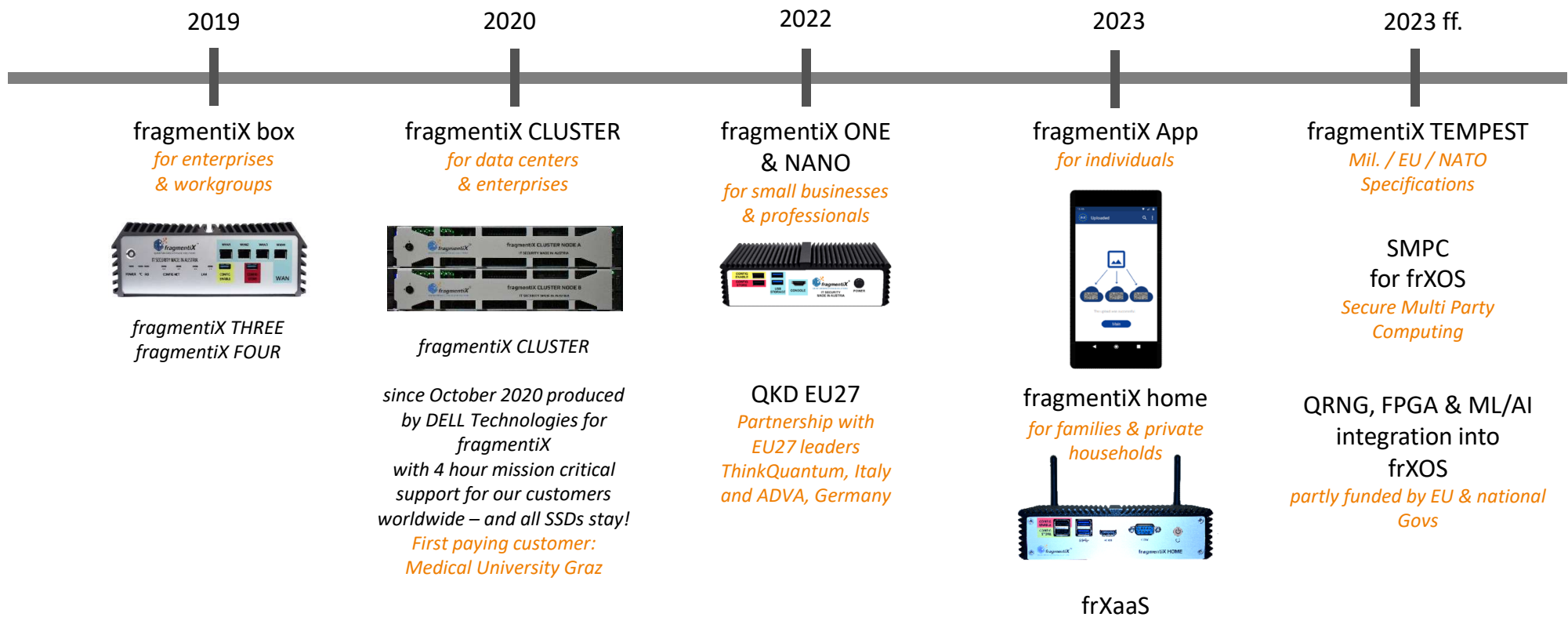
US cloud act implications: regardless what US-based cloud data providers assure you of, your data is always available to thousands of US officials and agencies, without your knowledge, at anytime.

All main US-based dominant providers will always try to convince their users that their data is safe.
On the other hand, it is those actors exactly that are not allowed by such law to let you know if they are requested to handover your data to any of the branches of the US government.

This is not their fault - this is just a relevant USA law that came to pass since 2018 that cloud data users must be aware of!

fragmentiX enables you to make your own choices about where on earth you decide to store your fragments, and to protect your data against governments, with industrial espionage implications.

fragmentiX Products Overview

2019

fragmentiX box
*for enterprises
& workgroups*

*fragmentiX THREE
fragmentiX FOUR*

2020

fragmentiX CLUSTER
*for data centers
& enterprises*

fragmentiX CLUSTER

*since October 2020 produced
by DELL Technologies for
fragmentiX
with 4 hour mission critical
support for our customers
worldwide – and all SSDs stay!
First paying customer:
Medical University Graz*

2022

**fragmentiX ONE
& NANO**
*for small businesses
& professionals*

QKD EU27
*Partnership with
EU27 leaders
ThinkQuantum, Italy
and ADVA, Germany*

2023

fragmentiX App
for individuals

fragmentiX home
*for families & private
households*

frXaaS

2023 ff.

fragmentiX TEMPEST
*Mil. / EU / NATO
Specifications*

**SMPC
for frXOS**
*Secure Multi Party
Computing*

**QRNG, FPGA & ML/AI
integration into
frXOS**
*partly funded by EU & national
Govs*

fragmentiX Advantages in a Nutshell

LOCATIONs

A   B   C

AWS S3   Wasabi S3   local DELL S3 storage

Each fragment is stored in its own public cloud or local S3/Azure/NFS storage LOCATION and only the owner of the files knows where these LOCATIONs are.
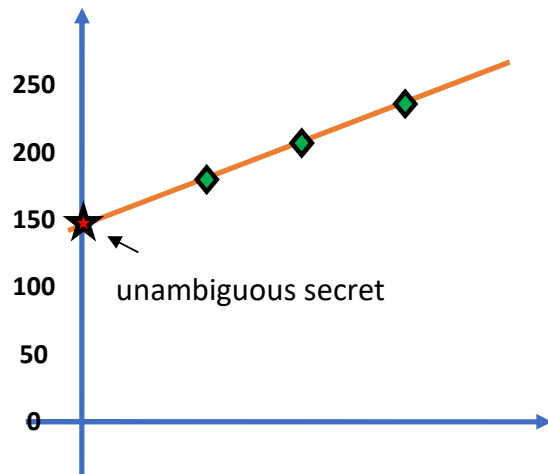

HAHAHA

If one of the fragments is stolen, it is absolutely useless for the data thief or spy because fragmentiX Secret Sharing enables you to store data with ITS – Information-Theoretical Security - not even future quantum computers have a chance to break it!

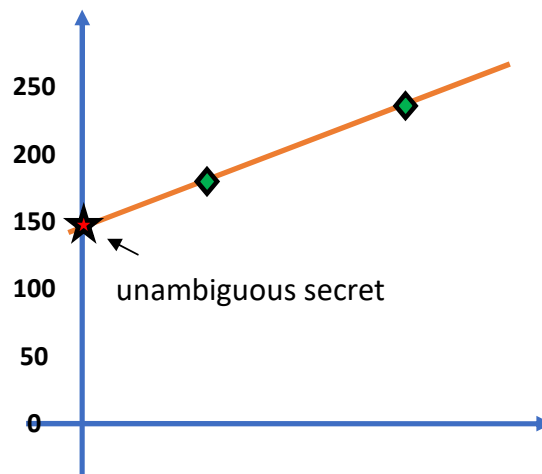# fragmentiX technology & mathematics

We can randomly select any number of points on the straight line, depending on how many fragments are to be created. The condition is always kept that we need any two points on the straight line to reconstruct the secret byte.

As soon as only 1 point (i.e. 1 fragment) is present or known, the secret byte could take any value.
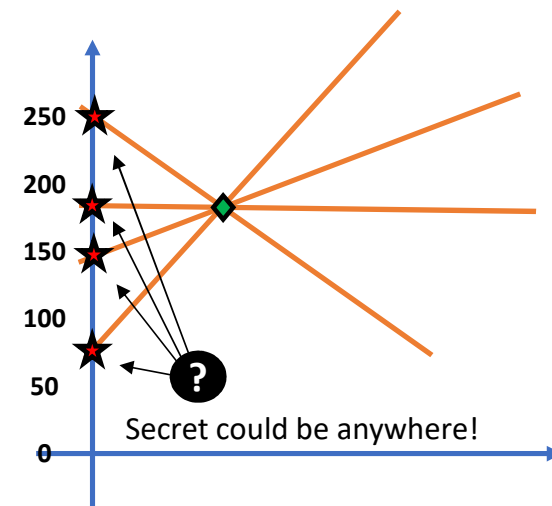

3 fragments: unambiguous secret

2 fragments: unambiguous secret

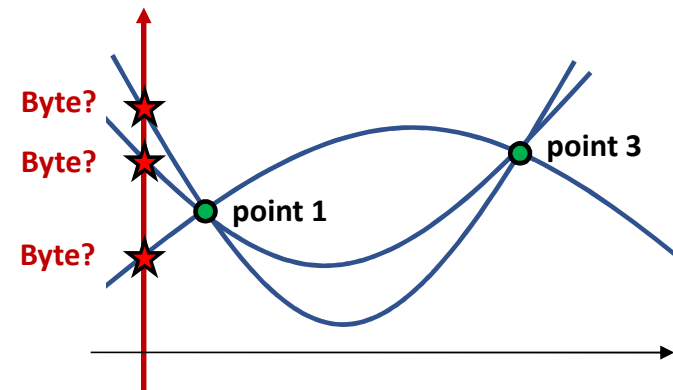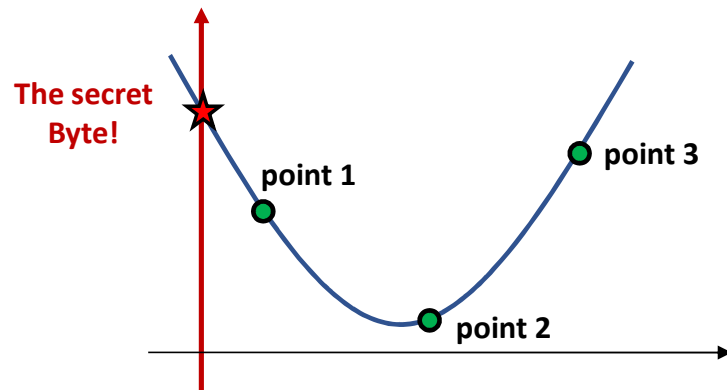**1 fragment:** Secret could be anywhere!

fragmentiX technology & mathematics

You need two points to define a line. But if e.g. 3 points are needed, then we use a parabola.

The rule is: you need 3 points to define the parabola uniquely. With 2 or less points the "secret byte" can take any value:

If more than 3 points (fragments) are needed, a polynomial function of higher degree must be used.

Using fragmentiX this can be extended to using up to 26 fragments.
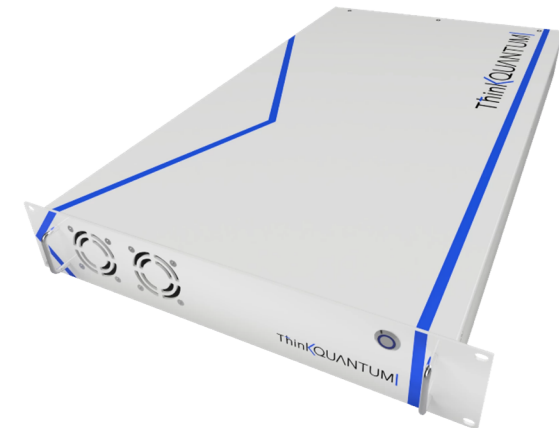
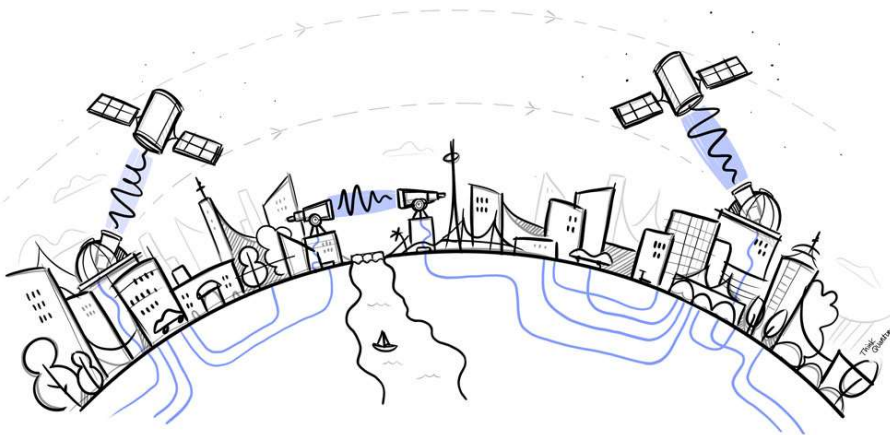# Strategic cooperations within EU
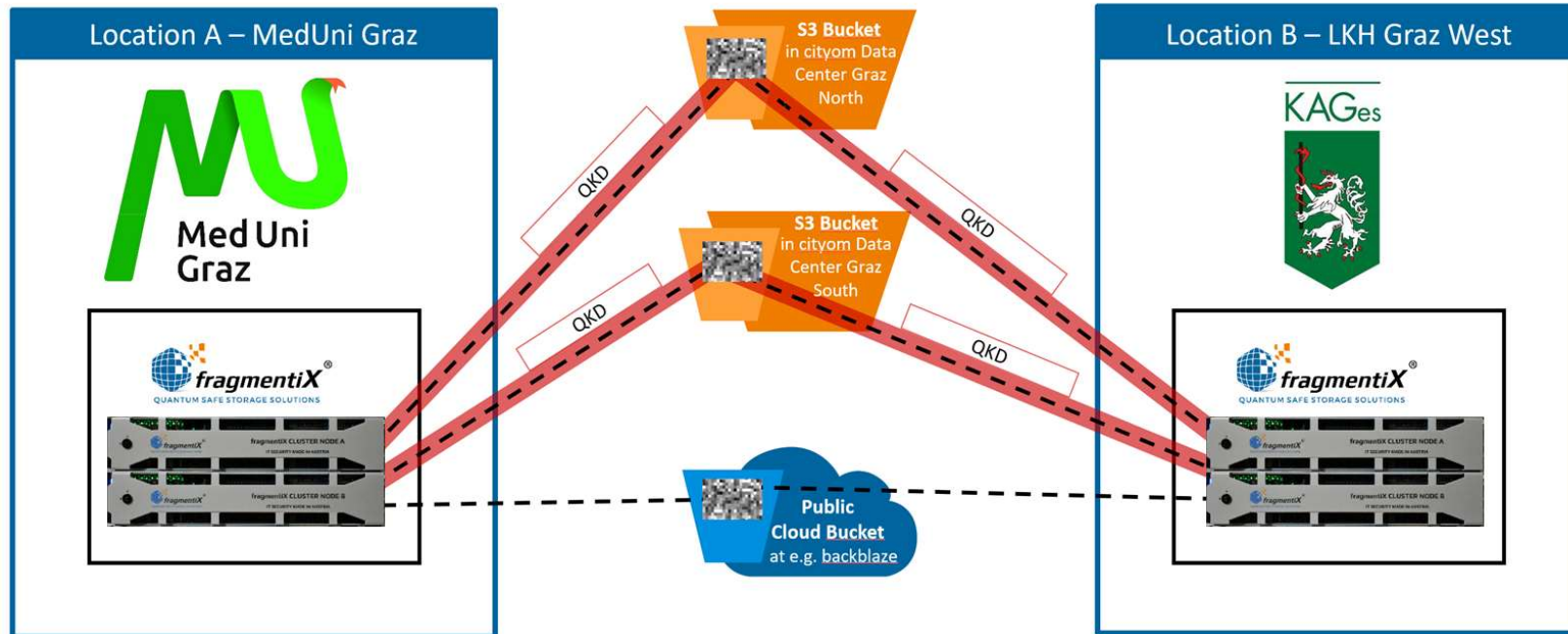
ThinKQUANTUM|

fragmentiX provides
- quantum key distribution (QKD)
- quantum random number generators (QRNG)
- satellite equipment

with a **complete European supply chain** from ThinkQuantum (ITA).
The QKD equipment can use optical fibres, free-space links, as well as satellite links.
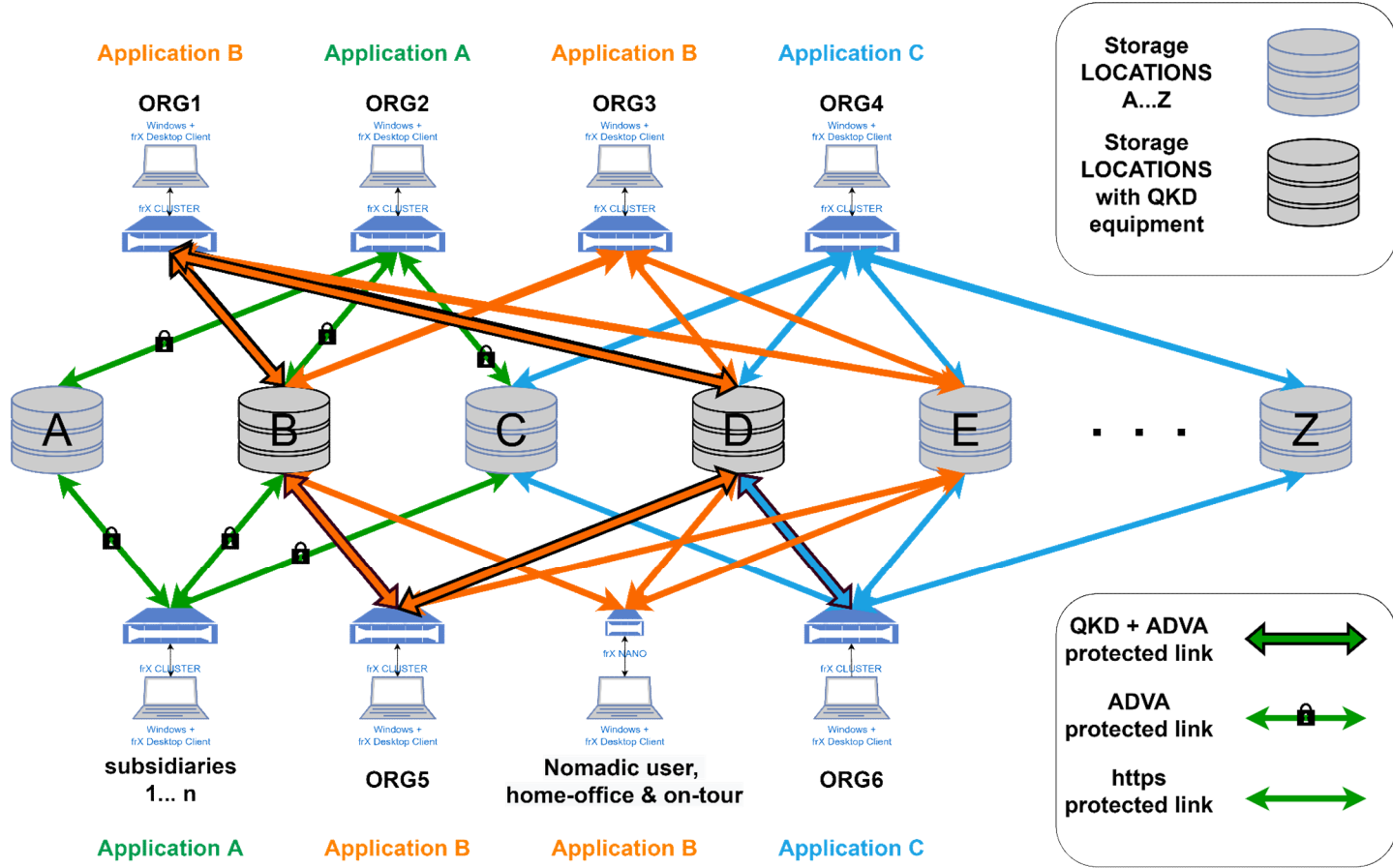
Protecting the Most Sensitive Medical Data

fragmentiX and QKD for Fortune 500 / Gov / Mil

Application A:
data protection at rest via fragmentiX,
data protection on transit via ADVA encryptors at ORG2 plus subsidiaries and storages A, B, C

Application B:
data protection at rest via fragmentiX,
data protection on transit partly via QKD

Application C:
data protection at rest via fragmentiX
https protected on transit, a single link QKD protected

Application B — ORG1 — Windows + frX Desktop Client — frX CLUSTER
Application A — ORG2 — Windows + frX Desktop Client — frX CLUSTER
Application B — ORG3 — Windows + frX Desktop Client — frX CLUSTER
Application C — ORG4 — Windows + frX Desktop Client — frX CLUSTER

Storage LOCATIONS A...Z
Storage LOCATIONS with QKD equipment

A   B   C   D   E   . . . .   Z

frX CLUSTER — subsidiaries 1... n — Windows + frX Desktop Client — **Application A**
frX CLUSTER — ORG5 — Windows + frX Desktop Client — **Application B**
frX NANO — Nomadic user, home-office & on-tour — Windows + frX Desktop Client — **Application B**
frX CLUSTER — ORG6 — Windows + frX Desktop Client — **Application C**

QKD + ADVA protected link
ADVA protected link
https protected link

Regional SME Cyber-Security Support

Existing customer network	New hardware at the customer	Cloud infrastructure

Server 1

PC 1

PC 2

...

PC 10

DELL T40 Microserver
at customer site with
16 TB harddrive and
Veeam backup software

fragmentiX ONE Appliance

S3 Bucket at **storage provider 1**

S3 Bucket at **storage provider 2**

S3 Bucket at **storage provider 3**
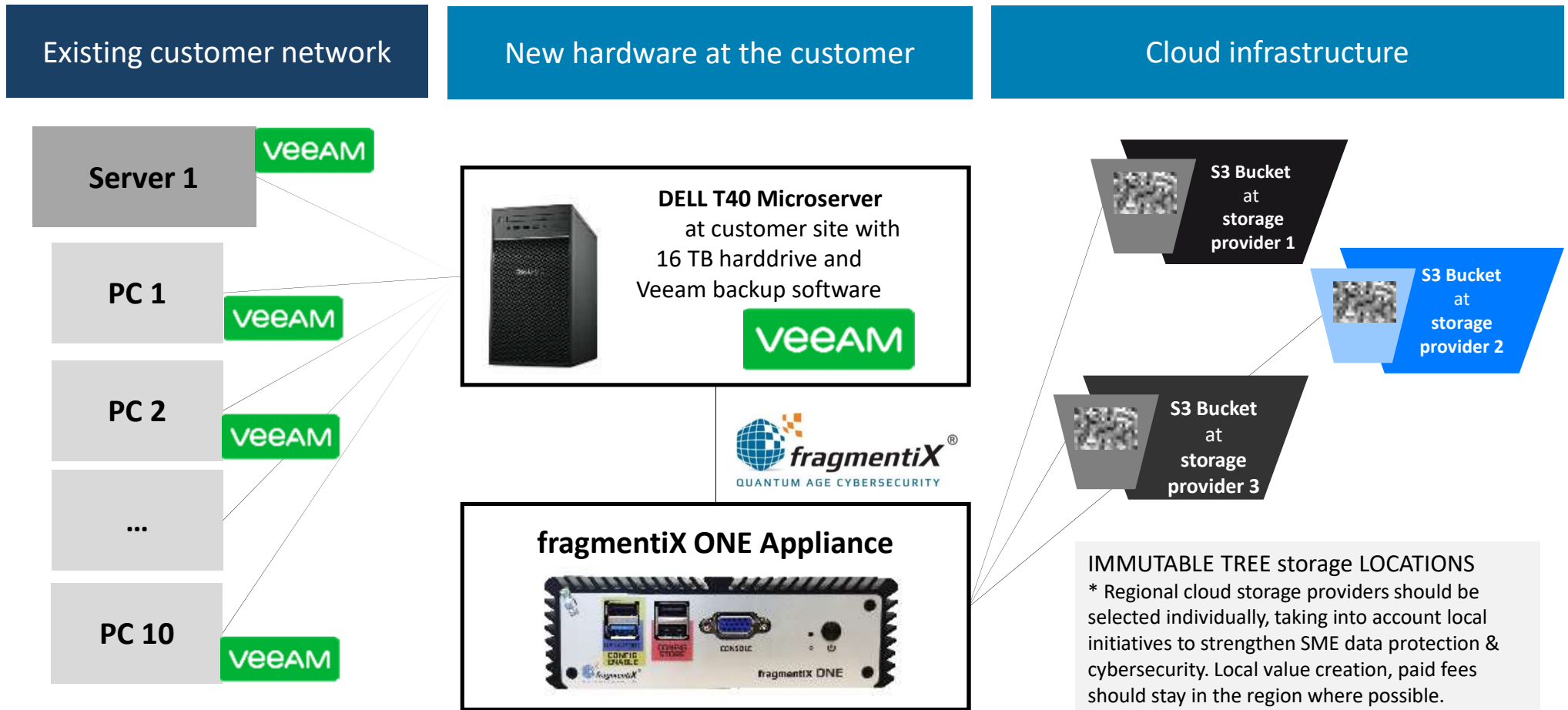
IMMUTABLE TREE storage LOCATIONS
* Regional cloud storage providers should be selected individually, taking into account local initiatives to strengthen SME data protection & cybersecurity. Local value creation, paid fees should stay in the region where possible.

© fragmentiX Storage Solutions GmbH

Technology Cooperations (partial list)

fragmentiX is a global DELL OEM partner.

Dell manufactures the fragmentiX CLUSTER hardware base servers to our specifications within the EU – actually in Poland - and provides 5 years of worldwide mission critical support.

Every fragmentiX CLUSTER customer is entitled to on-site support within 4 hours around the globe, sensitive parts like SSDs under all circumstances stay at customer site.

All security-related components and the frXOS operating system are installed by fragmentiX, DELL has no access to any IP held by fragmentiX.

Technology Cooperations (partial list)

fragmentiX is a global Maxeler and groq technology and sales partner.

The combined expertise and technologies of Maxeler and groq form the basis for the highest performance in processing AI/ML and in particular also LLMs (Large Language Models such as Chat-GPT and Bard).

Since uncontrolled use of public LLMs is prohibited for many relevant domains, it became business-critical to enable the use of these techniques in the field - and to train and work with sensitive and restricted corporate or government data.

For the most critical parts of LLM training, the qroq/Maxeler systems have proven to be up to several hundred times faster than other vendors' GPU systems.

Technology Cooperations (partial list)

The Austrian Institute of Technology (AT) has been an innovation- and cooperation partner from the very beginning. Together, we bridge the gap between research and business in numerous ventures.

Since its foundation in 2011 in Germany, CLOUD & HEAT has become a leading provider of sustainable data center technology and customized liquid cooling solutions. CLOUD & HEAT became the relevant European provider of turnkey data center solutions for enterprises and critical infrastructure.

With Titaniam, pioneers in the field of security through **data-in-use encryption**, based in Silicon Valley, USA, fragmentiX can provide users worldwide with optimal protection against ransomware and other data protection threats.

https://www.titaniamlabs.com

fragmentiX Essential Benefits

- fragmentiX delivers a security level that no single cloud storage provider alone can offer
  - Information-Theoretic Security (ITS) through Shamir Secret Sharing
  - Future quantum computers cannot hack or decrypt fragments: quantum safe storage
  - With fragmentiX there is no more need to trust any single provider or storage admin
- High availability + strong resilience
  - Multiple low-cost S3 storage providers – even with low service level – in combination with fragmentiX bring a higher security and resilience level compared to expensive high end storage providers
- Prevent cloud provider lock-in by using hybrid public / private cloud storage from the beginning
- World leading data security protection against ransomware threats including extortion with partners

Werner STRASSER, CEO & founder

fragmentiX®
QUANTUM AGE CYBERSECURITY

- Werner Strasser (*1965) is an Austrian entrepreneur
- Training in precision engineering (today mechatronics), admin and repair of first Unix systems in Austria, graphic / departmental supercomputing / vector processing (today HPC), publishing and document management systems, search technologies for public authorities (binary pattern recognition, semantic networks, ontologies), video conferencing solutions for companies and public authorities including military applications.
- Since 1991 self-employed entrepreneur with different roles for authorities in Austria & EU, IT security related topics, protection of data against theft, sabotage etc.
- 2016 the AIT (Austrian Institute of Technology) introduced a Secret Sharing Implementation to Mr.Strasser which led to:
  - foundation of fragmentiX GmbH in July 2018 - since Sept. 2019 headquarters at IST Austria Technology Park in Klosterneuburg, Austria.
  - Foundation of fragmentiX Schweiz AG in the canton of Schwyz in Sept. 2020.
- Personal vision: Enabling everyone to protect their privacy, with an emphasis on digital sovereignty and dignity.
- Many years of expert work for, among others, the Ministries of the Interior, Justice and Defense in Austria.
- Unpaid voluntary teaching position for cyber recruits in "Digital Forensics" at the Academy of the Austrian Armed Forces.

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Annex - fragmentiX Products

	ONE®	THREE®	FOUR®	CLUSTER®	NANO®
Application environments	Personal & SME Office 1-5 users	Office up to 20 users	Large groups and Authorities up to 40 users	Datacenters & enterprises	Working from home or while traveling in conjunction with fragmentiX CLUSTER®
Max.# storage LOCATIONs	8	16	26	26	3
Storage protocols / Storage media supported	AWS S3 compatible, MS Azure BLOB, NFS, USB	AWS S3 compatible, MS Azure BLOB, NFS, USB	AWS S3 compatible, MS Azure BLOB, NFS, USB	AWS S3 compatible, MS Azure BLOB, NFS	AWS S3 compatible, MS Azure BLOB, NFS
LAN interfaces	1 x 1 Gbit/s	1 x 1 Gbit/s	1 x 1 Gbit/s	1 x 10 Gbit/s SFP+ (potentially up to 8 with future upgrades)	2 x 1 Gbit/s
WAN interfaces	2 x 1 Gbit/s	4 x 1 Gbit/s	8 x 1 Gbit/s	8 x 10 Gbit/s SFP+	2 x 1 Gbit/s
CONFIG NET interface	1 x 1 Gbit/s	1 x 1 Gbit/s	1 x 1 Gbit/s	1 x 1 Gbit/s	-
# fragmentiX desktop client licenses included	5	10	20	50	1
frXOS firmware/OS updates included	1 year	1 year	1 year	1 year	1 year
HW mission critical support	-	-	-	5 years included	-
Size	154 x 128 x 49 mm	227 x 261 x 88 mm	227 x 261 x 88 mm	19", 2U	154 x 128 x 49 mm
Weight	0,7 kg	4,7 kg	4,7 kg	ca. 23 kg	0.7 kg
AC input	100-230V AC	100-230V AC	100-230V AC	100-230 V AC, 50/60 Hz	100-230 V AC
Power supply	36 W	120 W	120 W	2 x 495 W redundant	36 W