DotNext 2020

THE AR CLOUD IS REAL

BUILDING CROSS-PLATFORM AR EXPERIENCES WITH AZURE SPATIAL ANCHORS

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DOTNEXT

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REPLY VALOREM

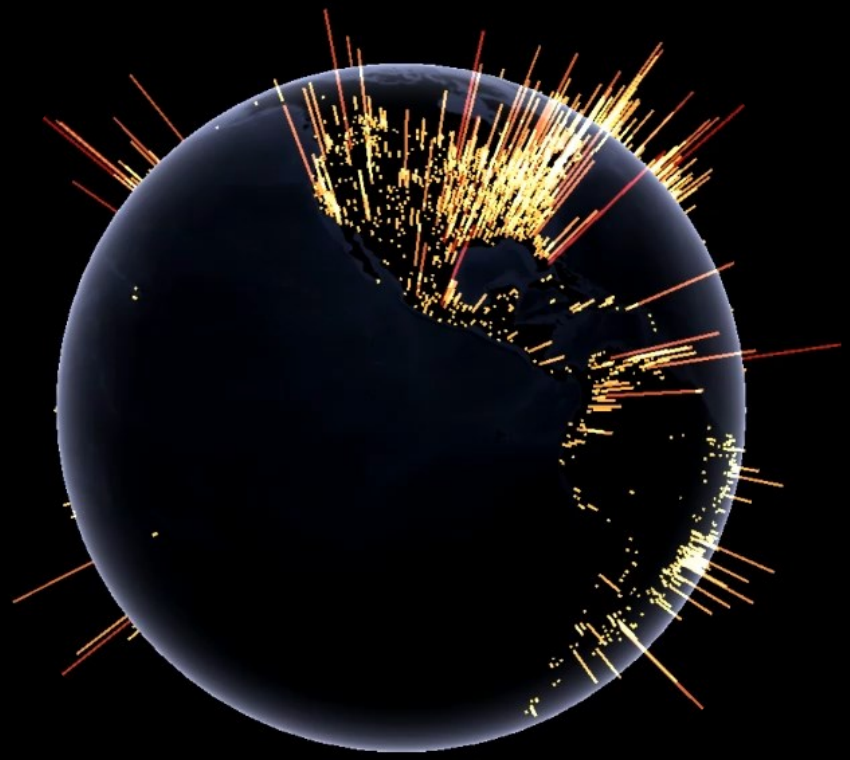
WHY IS MOBILE AR RELEVANT?

Market research by Gartner:

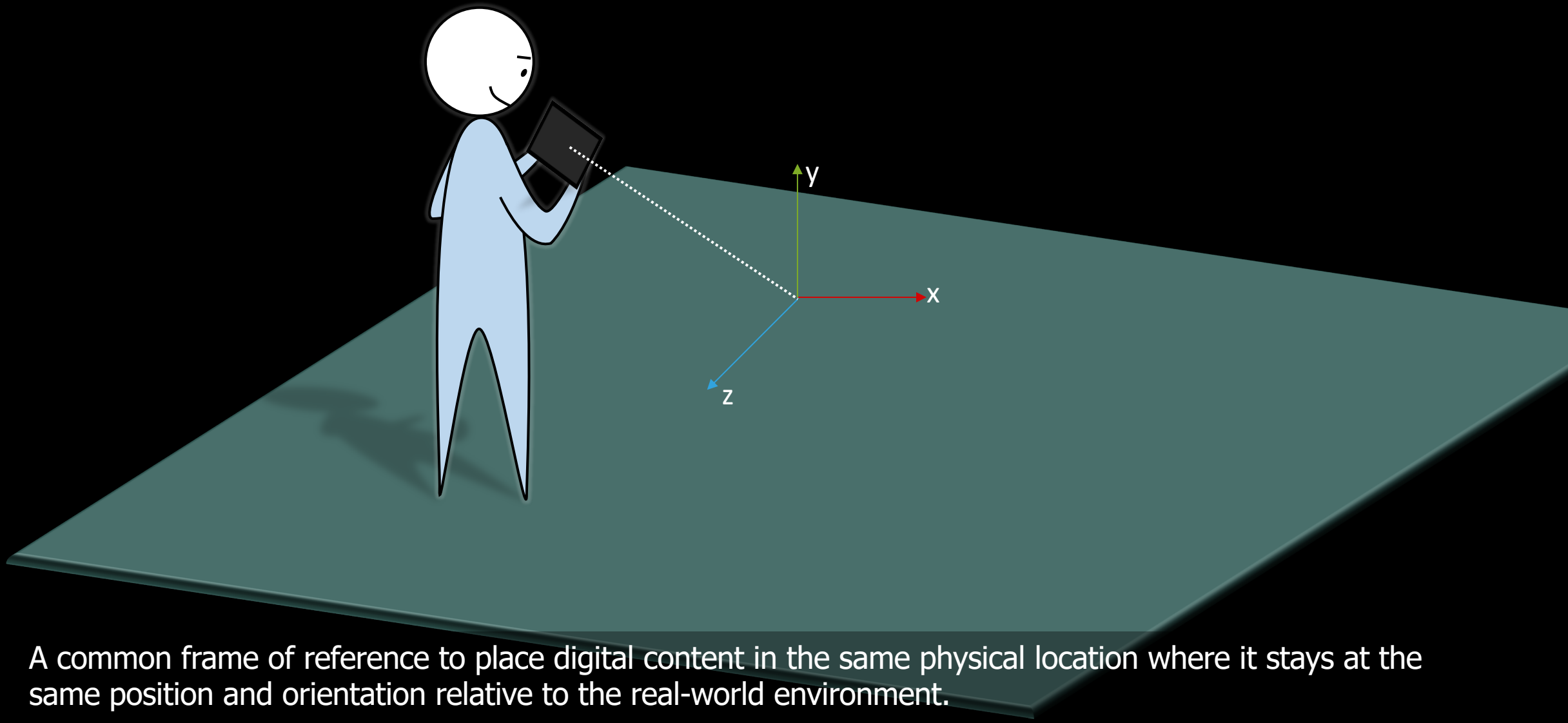
“In the next decade, the AR cloud could form the multilayer digital twin of the physical world. This will enable new interactions and in term new business models and ways to monetize the physical world. The AR cloud will change the way that enterprises think of physical assets, how they interact with customers and the associated risks.”

WHY DOES THE CLOUD PLAY A ROLE HERE?

The cloud provides the secure storage and scalable processing for a digital copy of the real world which can be accessed by any user at any time on any device for shared AR content.

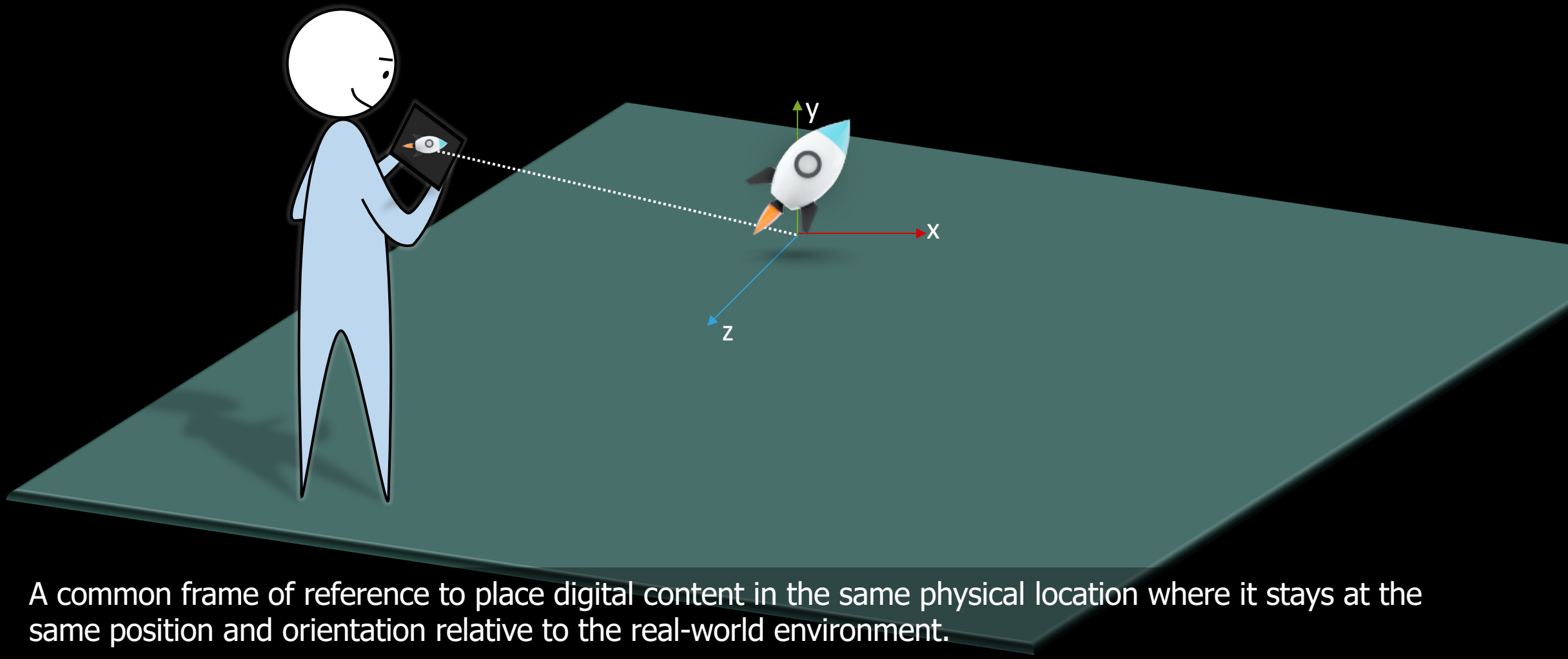


What is a Spatial Anchor?



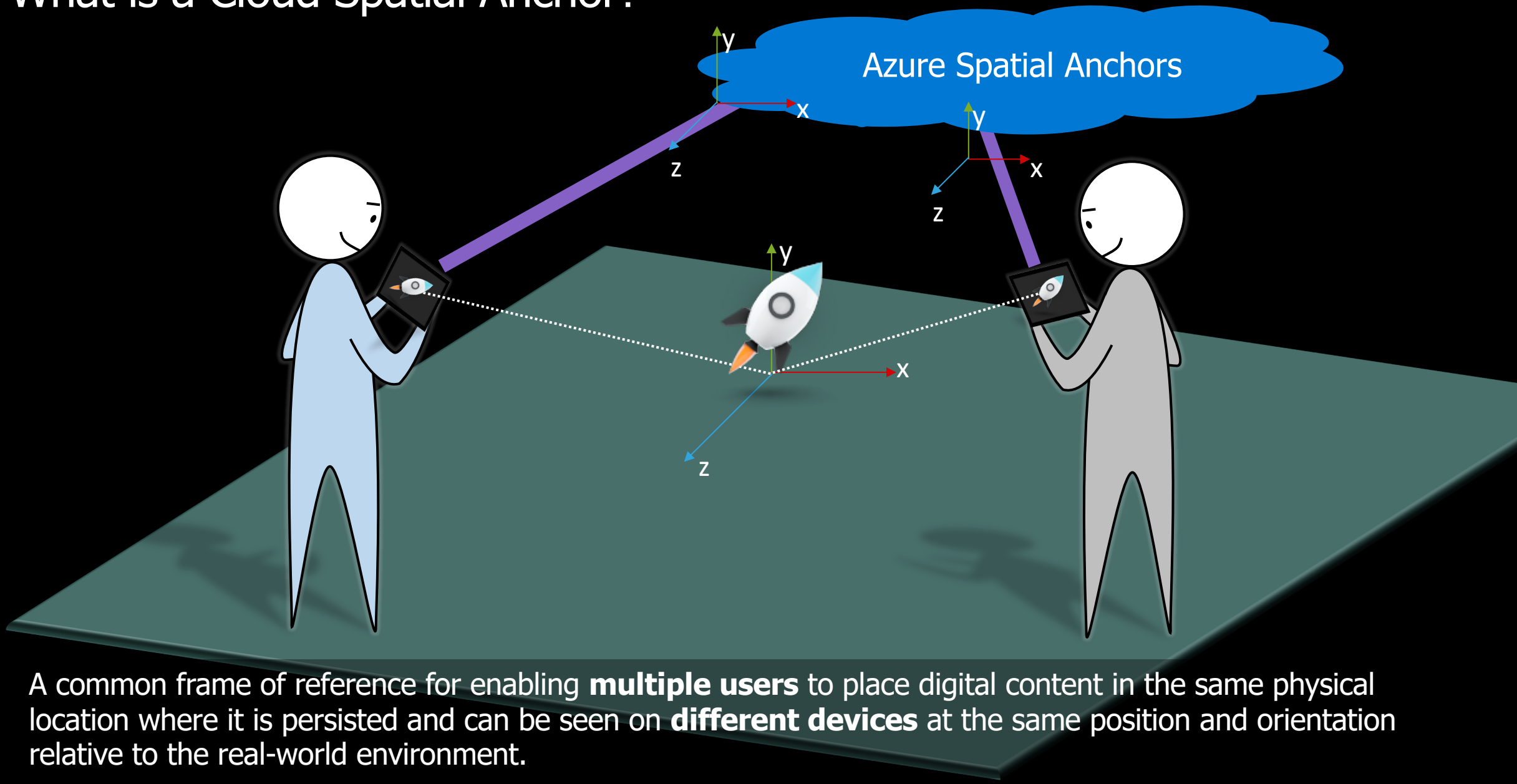
A common frame of reference to place digital content in the same physical location where it stays at the same position and orientation relative to the real-world environment.

What is a Spatial Anchor?



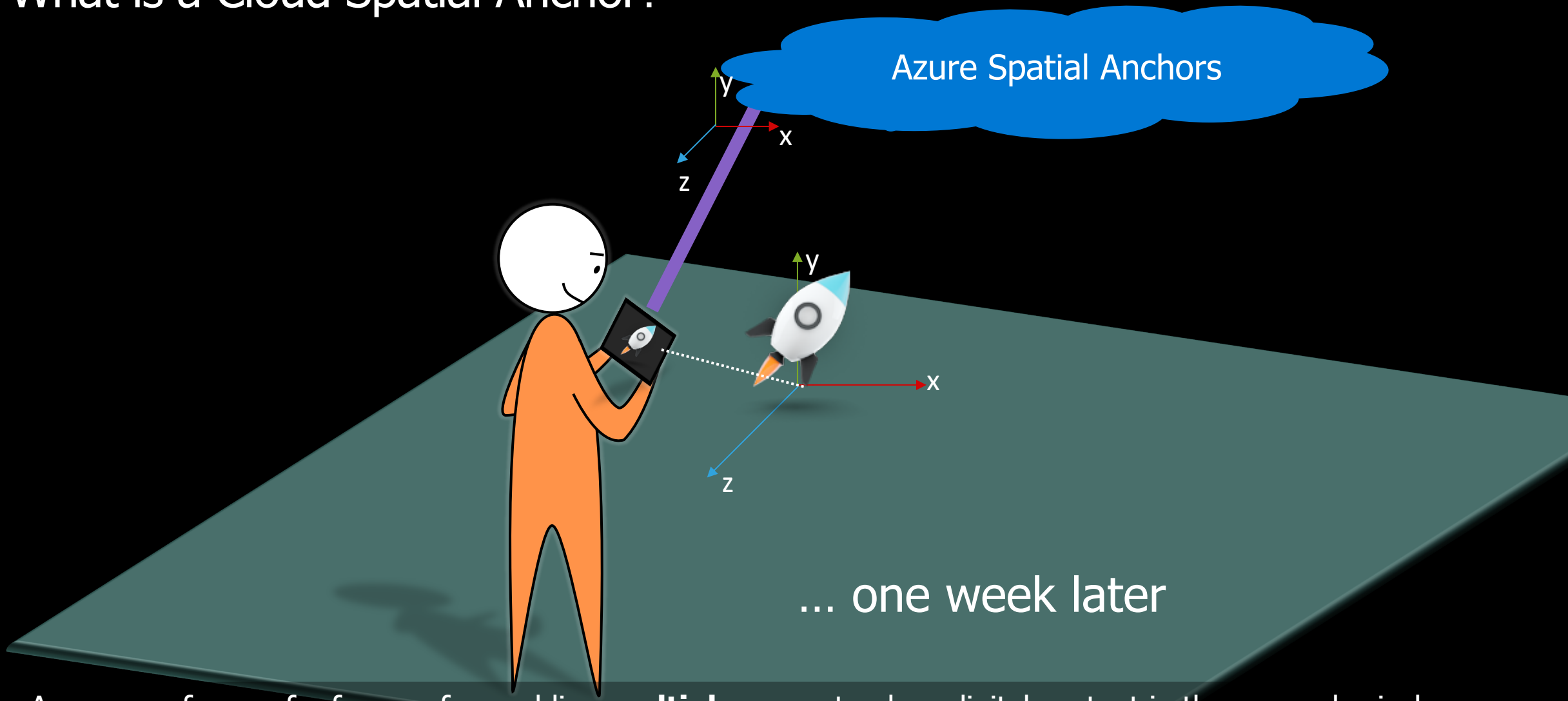
A common frame of reference to place digital content in the same physical location where it stays at the same position and orientation relative to the real-world environment.

What is a Cloud Spatial Anchor?



A common frame of reference for enabling **multiple users** to place digital content in the same physical location where it is persisted and can be seen on **different devices** at the same position and orientation relative to the real-world environment.

What is a Cloud Spatial Anchor?



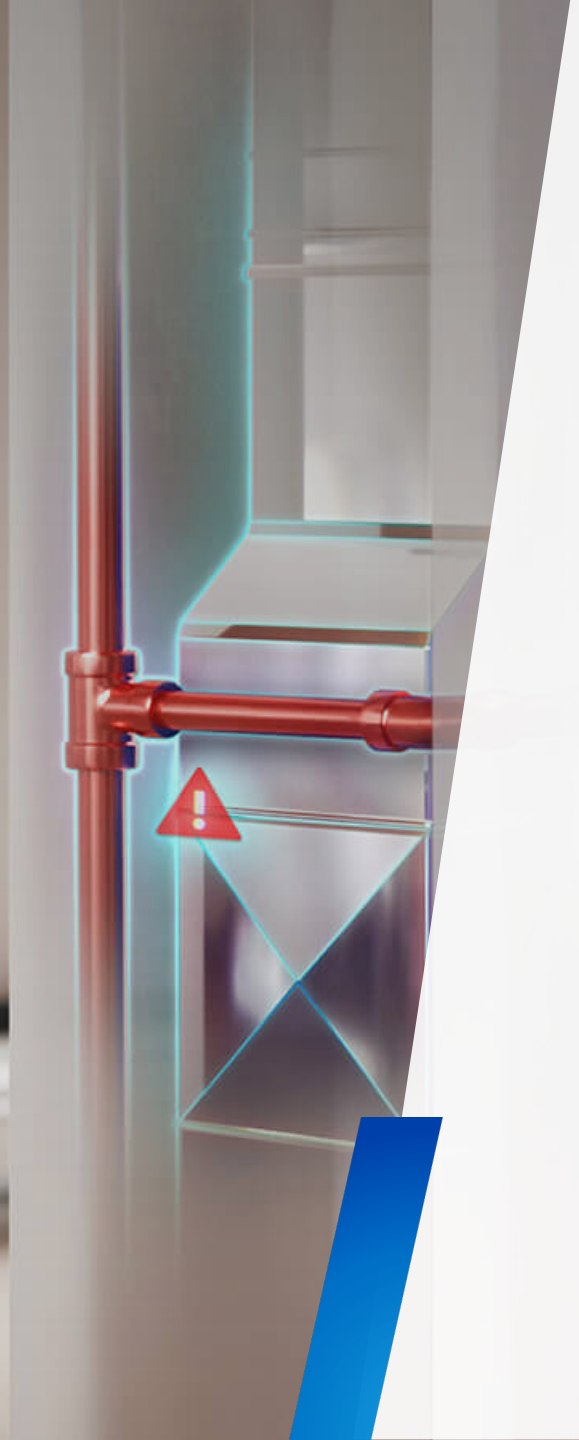
A common frame of reference for enabling **multiple users** to place digital content in the same physical location where it is **persisted** and can be seen on **different devices** at the same position and orientation relative to the real-world environment.

REPLY
VALOREM

REPLY
VALOREM

FOV: 60
FPS: 769.2
BO_RENDERING

Mesh: A-01445-{6aa4e011-ddb5-48ed-8d53-49211a1f5de8}.bin_index.ply
Vertices: 2,546
Faces: 0
Selection: v: 0 f: 0
VC



PERSISTENT MULTI-USER VIRTUAL CONTENT

Collaborative design reviews

Real-time IoT digital twin data on actual equipment

WAYFINDING

Empowering firstline workers
to navigate large facilities

WAYFINDING

Empowering firstline workers to navigate large facilities

Guiding the way to IoT sensors or failing equipment

WAYFINDING

Guiding the way through a store following a spatial grocery list

WAYFINDING

Guiding the way through a store following a spatial grocery list

Empowering people who are blind or low vision with spatial sound anchors

WAYFINDING

Guiding the way through a store following a spatial grocery list

Empowering people who are blind or low vision with spatial sound anchors

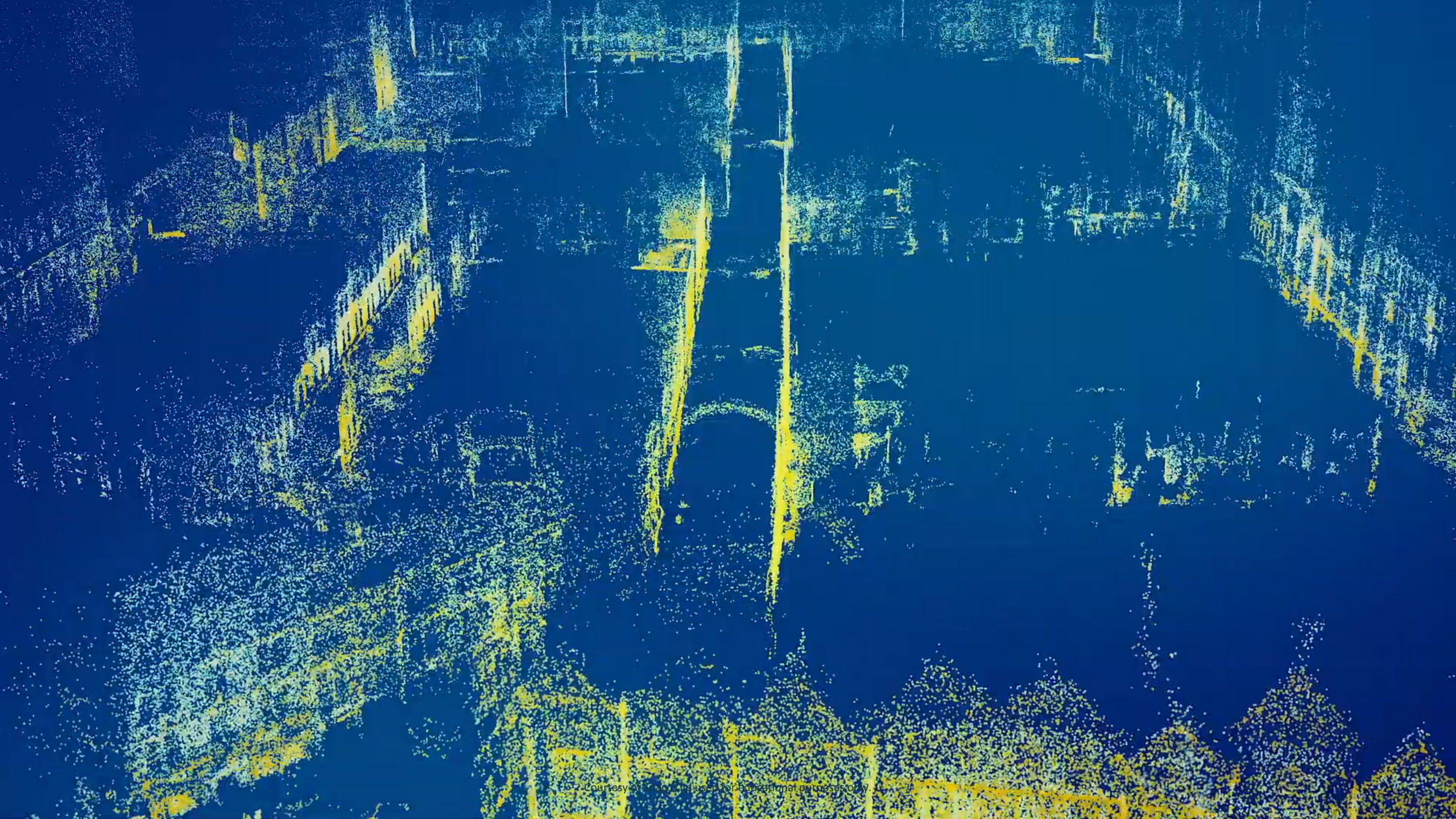
Navigating large areas like theme parks, museums, festivals

Courtesy of Studio05. Clip used for educational purposes only.

Studio05.nl

PERSISTENT MULTI-USER VIRTUAL CONTENT

Urban murals and digital art



Courtesy of [illegible] used for educational purposes only.

PERSISTENT MULTI-USER VIRTUAL CONTENT

Urban murals and digital art

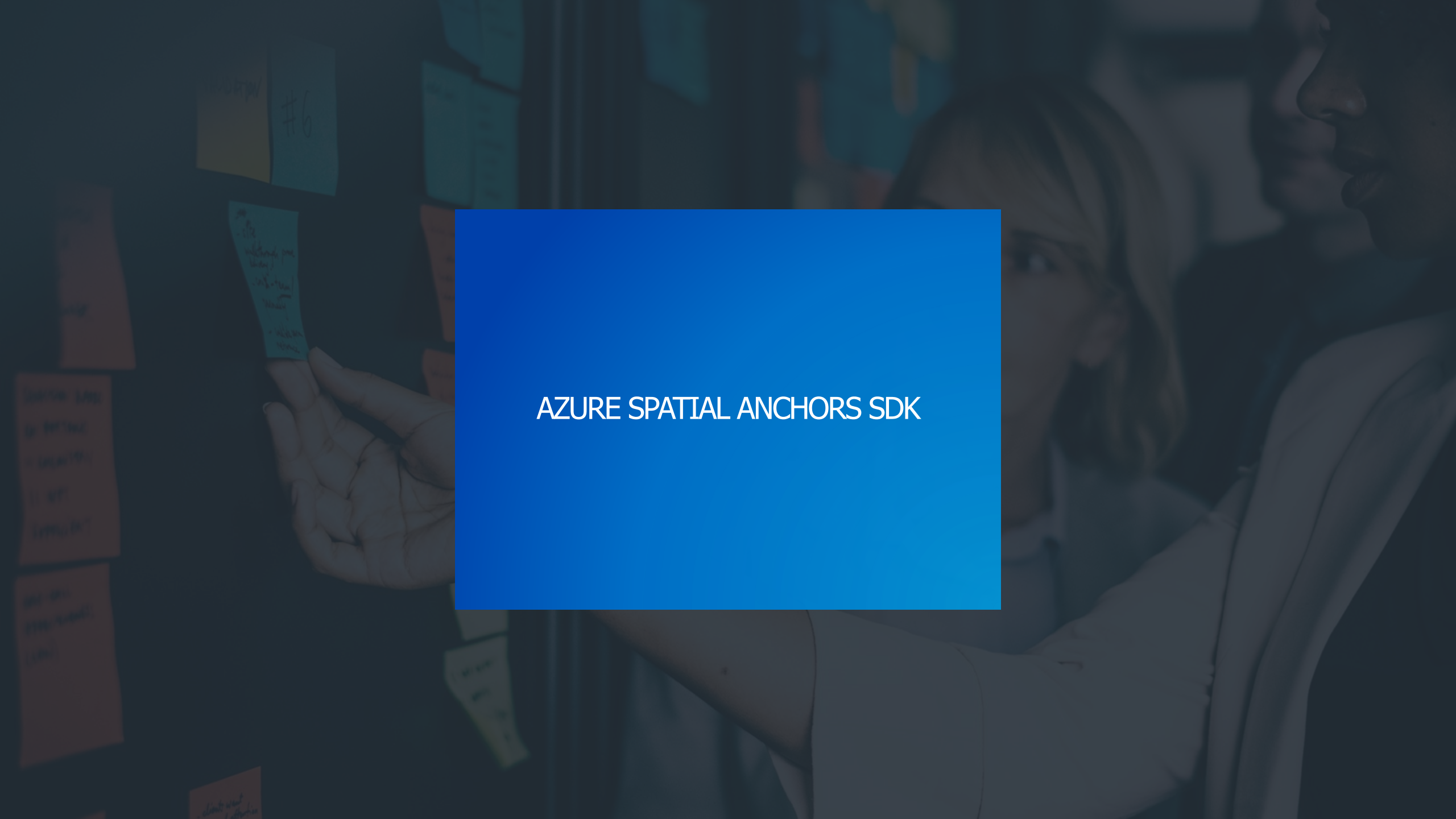
3D capture visualization

PERSISTENT MULTI-USER VIRTUAL CONTENT

Urban murals and digital art

3D capture visualization

Architecture visualization


AZURE SPATIAL ANCHORS SDK

Azure Spatial Anchors SDK

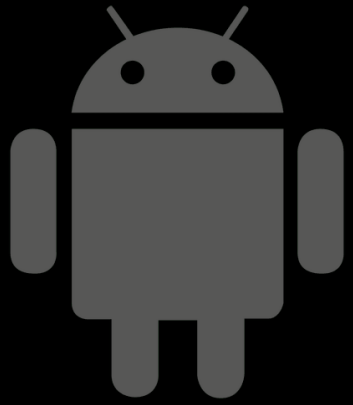
HoloLens

Unity

C++/WinRT

iOS (ARKit)

Unity
Xamarin
Objective-C or Swift

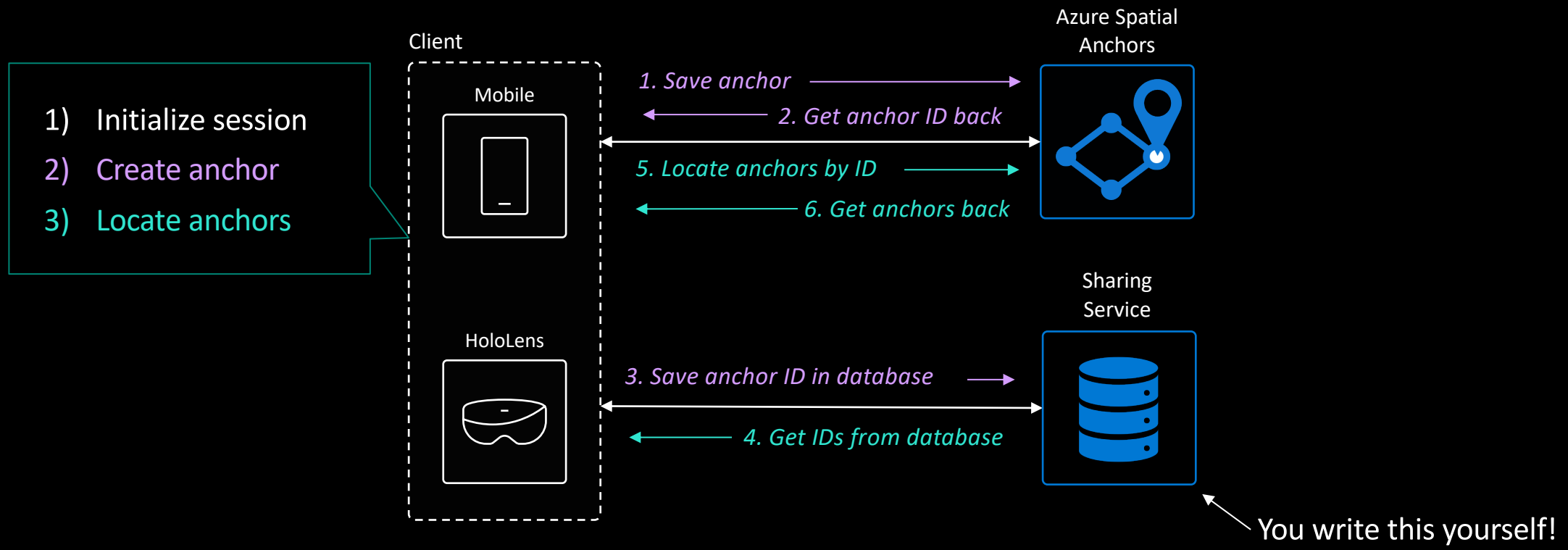


Android (ARCore)

Unity
Xamarin
Java or C++/NDK

SOLUTION ARCHITECTURE

Persistent virtual content



API Key Concepts – Init, Create, Save

CloudSpatialAnchorSession

- Provides core services (Ex. Create, locate, update, delete CloudSpatialAnchor's)
- Captures data about the environment

CloudSpatialAnchor

- Links to the underlying AR platform Anchor (*WorldAnchor on HoloLens, ARAnchor on iOS, Anchor on Android*)
- Holds an ID, Expiration, and Properties (Dictionary<String, String>)

CreateAnchorAsync(CloudSpatialAnchor anchor) { … }

- Save a CloudSpatialAnchor to Azure Spatial Anchors
- Returns the CloudSpatialAnchor with an ID assigned

API Key Concepts – Load, Relocalize

CreateWatcher(AnchorLocateCriteria criteria)

Begins to watch for anchors that meet the specified criteria

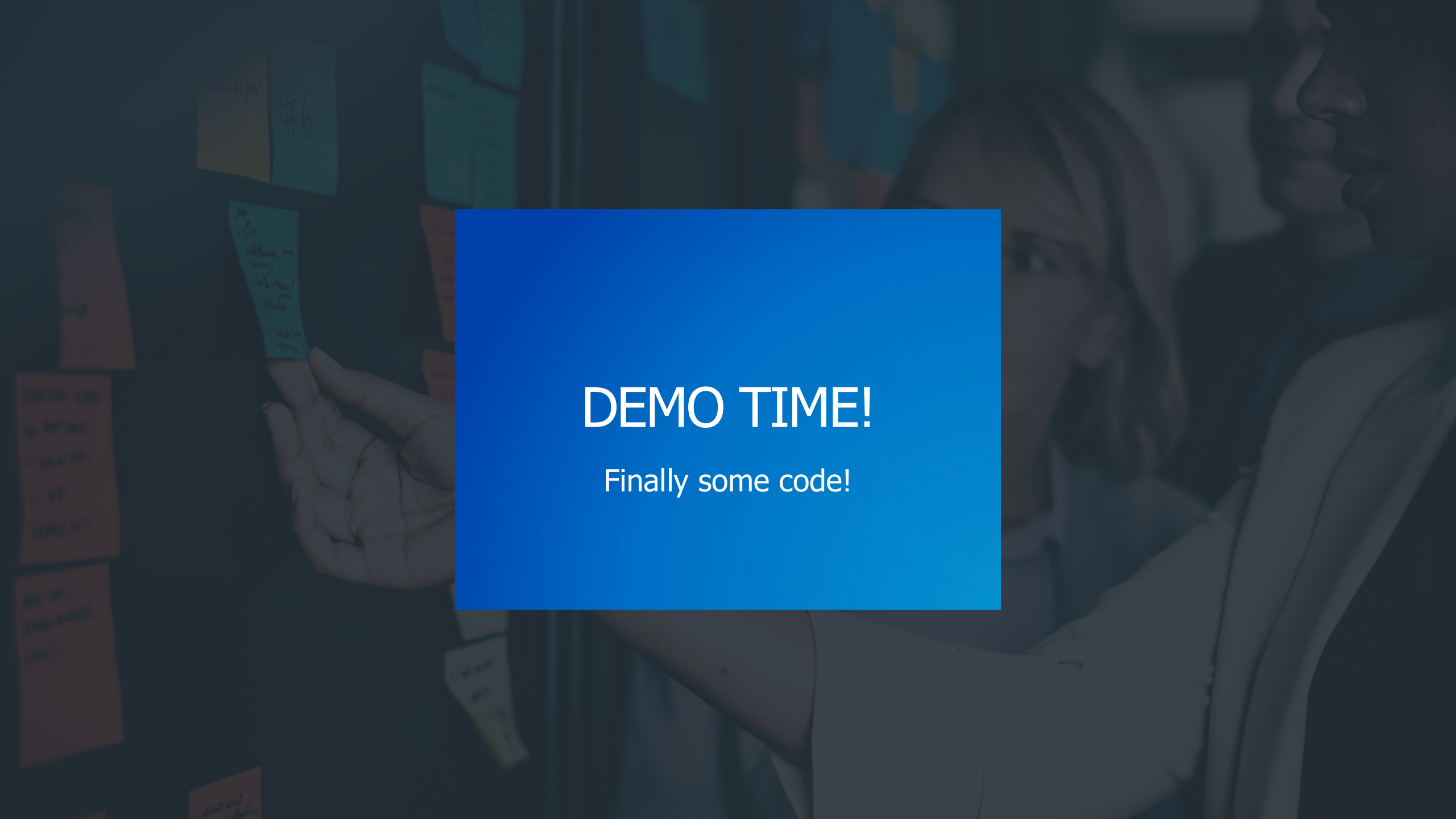
Returns located CloudSpatialAnchor's through a delegate

AnchorLocateCriteria

Identifiers = Assign an array of CloudSpatialAnchor IDs

NearAnchor = Assign NearAnchorCriteria with a known, nearby anchor (for wayfinding)

NearDevice = Assign NearDeviceCriteria with distance in meters (using GPS, BT, Wi-Fi)
Requires an initialized CloudSpatialAnchorSession.LocationProvider


DEMO TIME!
Finally some code!

DEMO TIME!
http://bit.ly/asa10code

Further resources

Rene Schulte	@rschu http://blog.rene-schulte.info
Azure Spatial Anchors demo code	http://bit.ly/asa10code
Azure Spatial Anchors docs	https://aka.ms/asa-docs
Azure Spatial Anchors //build + MR Dev Days Talk	http://bit.ly/bld19asa

THANK YOU

BE SAFE ❤️

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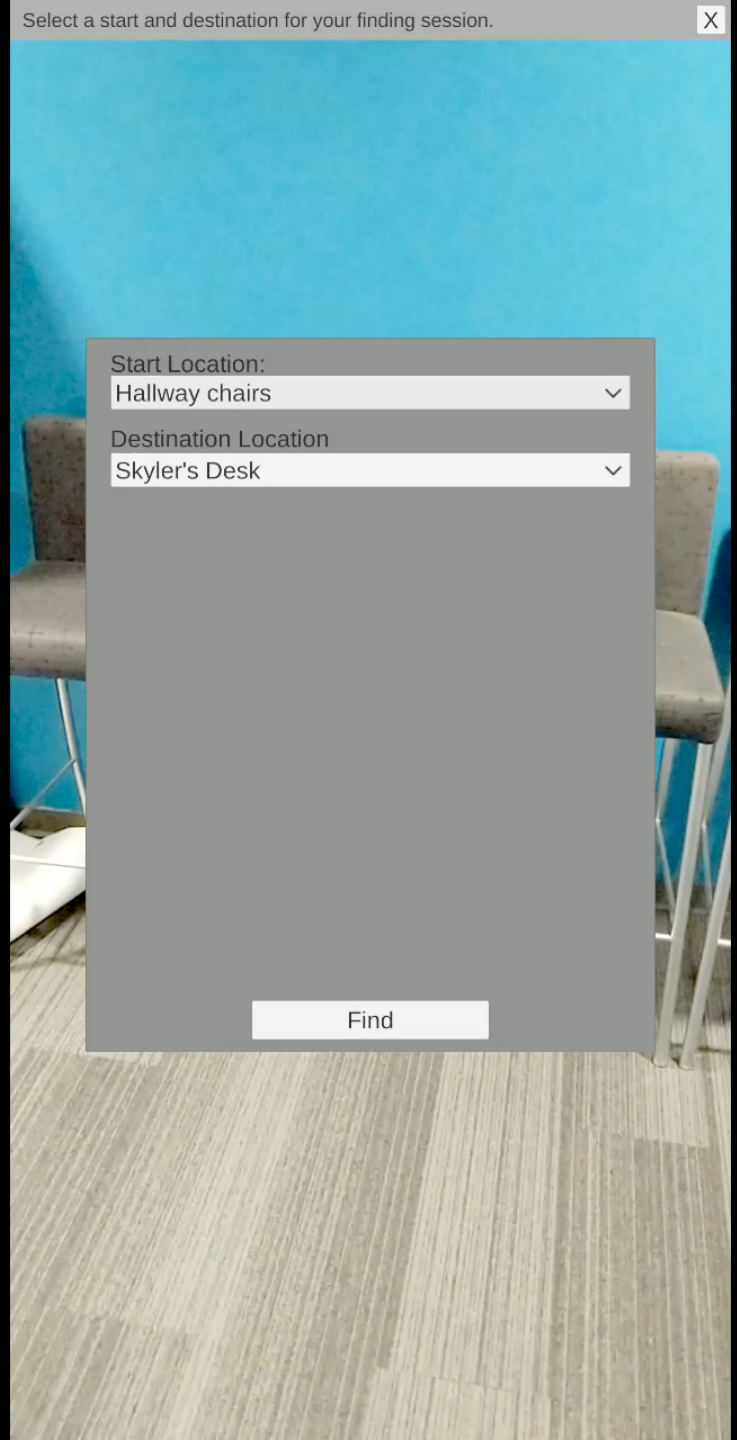
@rschu

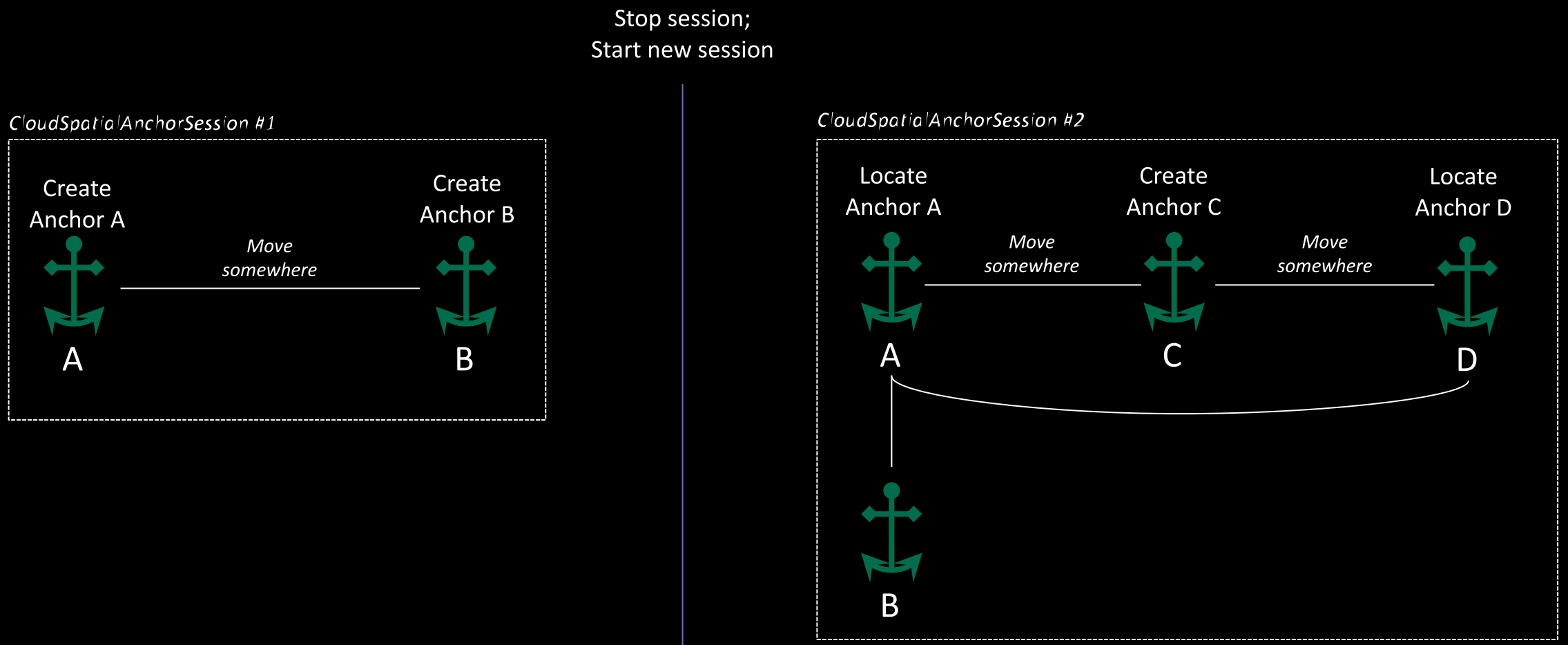
WAYFINDING

Wayfinding


Select a start and destination for your finding session.
X
Start Location:
Hallway chairs
Destination Location
Skyler's Desk
Find

Connected anchors

Solid white lines represent graph edges



Wayfinding

- Locate anchors by ID

```
public void LocateAnchors(String[] identifiers) {
    AnchorLocateCriteria criteria = new AnchorLocateCriteria();
    criteria.setIdentifiers(identifiers);
    cloudSession.createWatcher(criteria);
}
```

- Locate anchors **connected** to an anchor you have already located

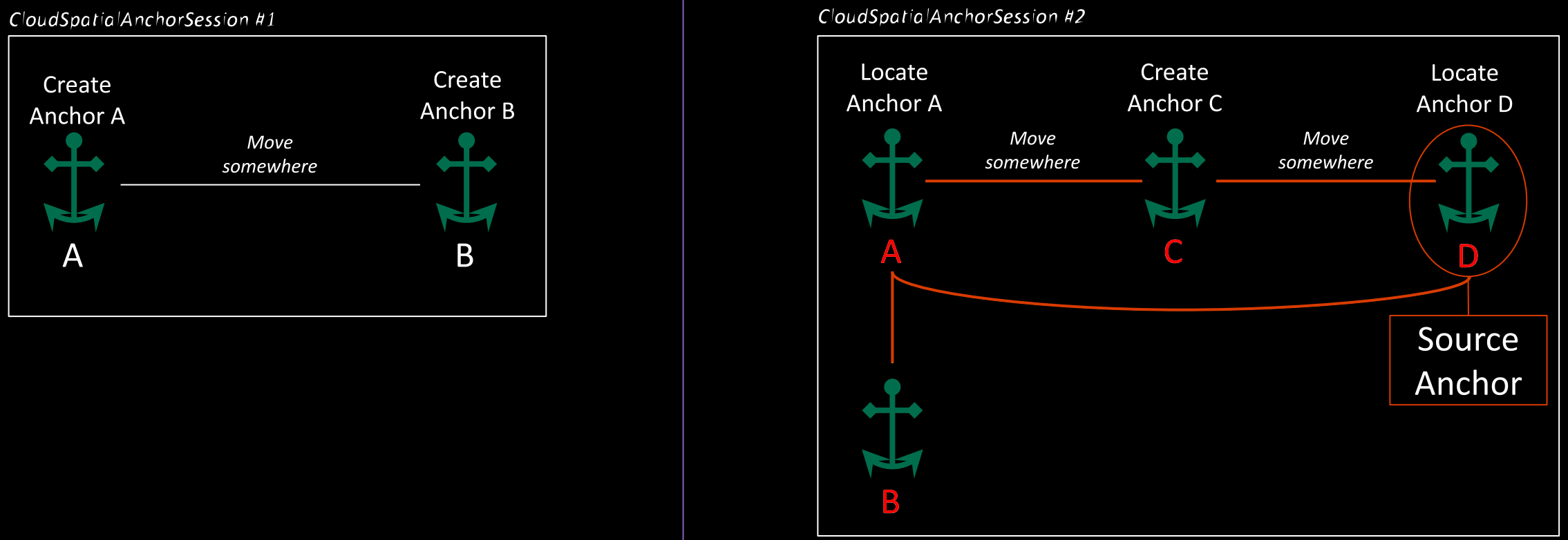
```
public void LocateNearbyAnchors(CloudSpatialAnchor anchor) {
    NearAnchorCriteria nearAnchorCriteria = new NearAnchorCriteria();
    nearAnchorCriteria.setSourceAnchor(anchor);

    AnchorLocateCriteria criteria = new AnchorLocateCriteria();
    criteria.setNearAnchor(nearAnchorCriteria);
    cloudSession.createWatcher(criteria);
}
```

Connected anchors

Solid white lines represent graph edges

Stop session;
Start new session



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