
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

CMP230

Drive! An interactive demo using AWS SimSpace Weaver

Mike Taylor

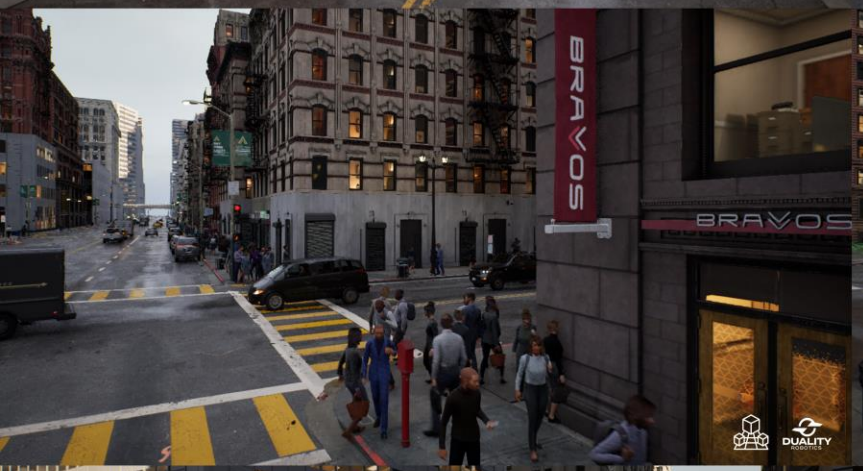
Co-Founder & CPO
Duality Robotics

Ryan Qi

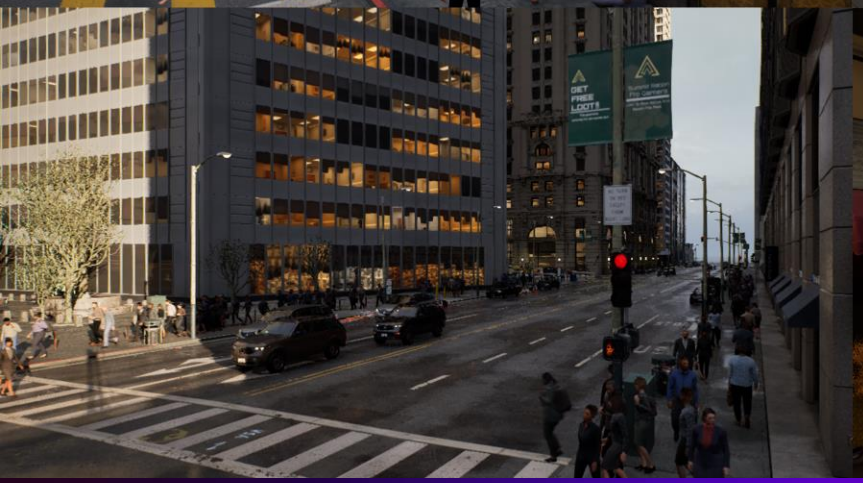
Principal Specialist
AWS

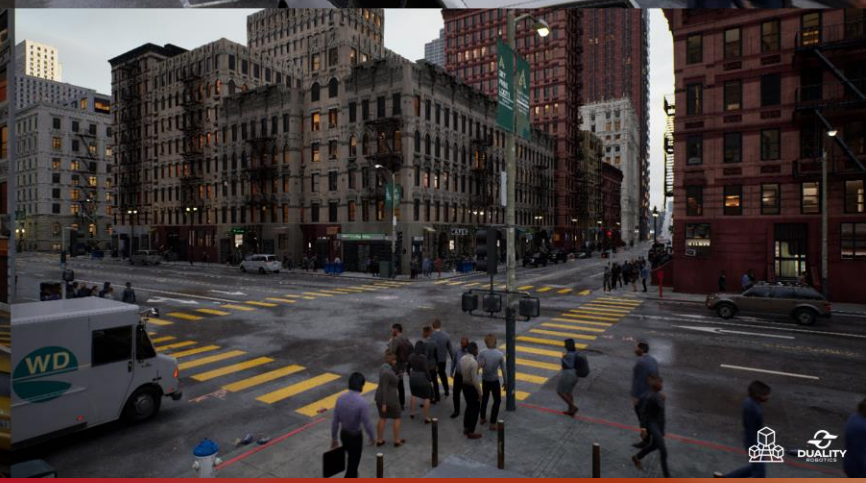
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Singular focus on building best-in-class digital twin integration platform



+





Team

- 50 person distributed team with expertise in simulation, rendering, game development, machine learning, robotics, software engineering, and cloud computing
- Over 70 related patents

Founding question:

How can we use the tools from entertainment to solve challenging engineering problems?

Support Network

EPIC GAMES

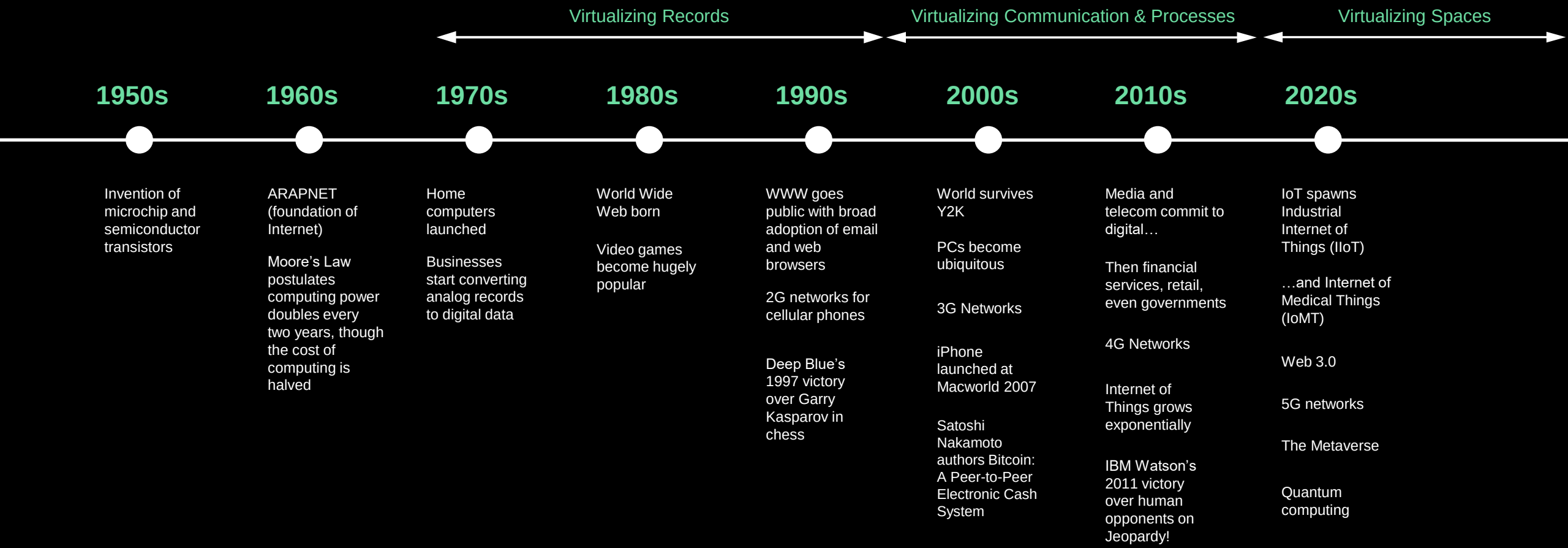
Drive Capital

HG Ventures

LEMNOS

A Brief History of Digital Transformation

The metaverse is a virtualization of physical spaces along with the assets and interaction within them



* *Graphic by Michael Jones*

Simulation is the engine that powers the metaverse

Determines what can be virtualized and the fidelity of interactions & resulting data

Physical Asset



IoT Twin

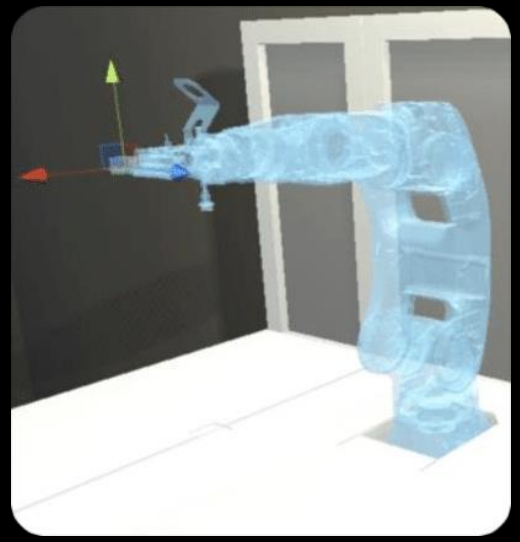
Data-Driven Modeling

Preditive Twin

Simulation

Digital Twin
(Virtualized Entity)

Digital Asset



Dual-use technology gap

Consumer metaverses don't translate to the real world



Engagement



Marketing & Brand Presence

Want

- Economics of Scale
- Diversity
- Real-Time Precision
- Scalability

Need

- Accuracy
- Predictability
- Security
- Integration

Digital twin simulators don't have the scale & dynamism



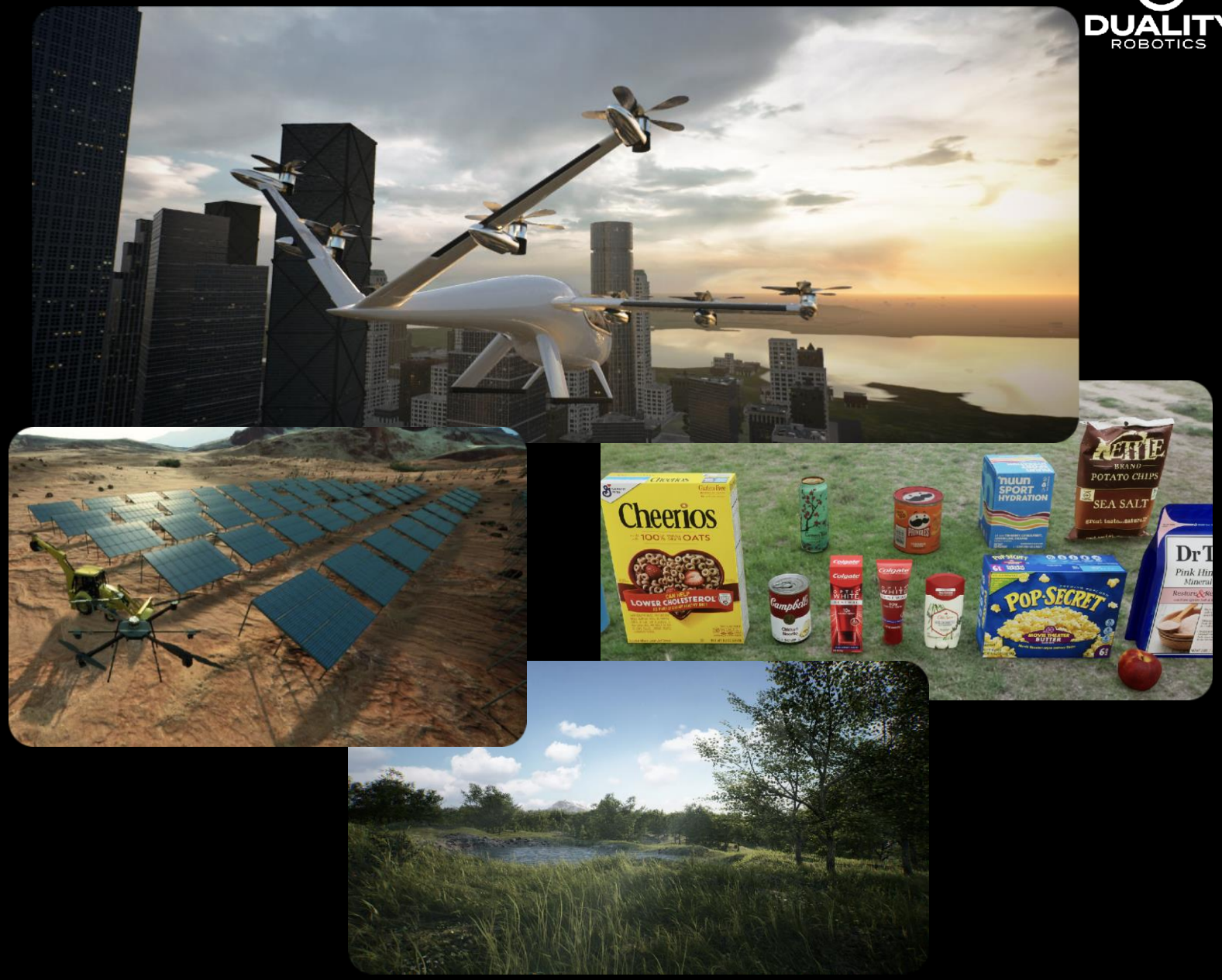
Accurate



Meaningful Interactions & Accurate Data

Metaverse to solve real-world problems

- Composed of digital twins rather than avatars
- Accurate and deterministic simulation to generate high-fidelity data rather than playing games or social interactions
- Data permeability between the physical and virtual worlds



Falcon: Digital Twin Integration Platform

Supports all types of digital twins, scenarios, and data needs

DUALITY ROBOTICS

End-to-end workflows: Acquire → Manage & Share → Simulate → Generate Data

Item Twins





Space Twins





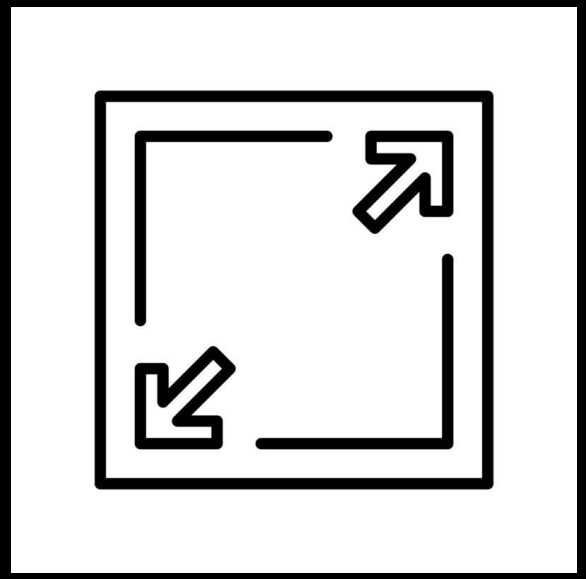
System Twins

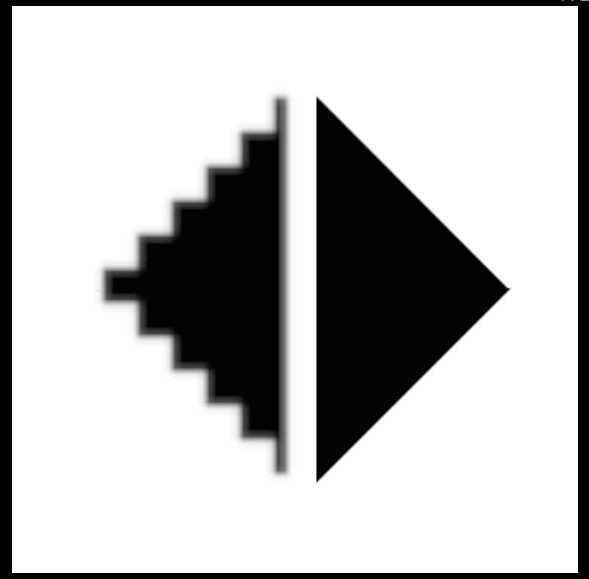






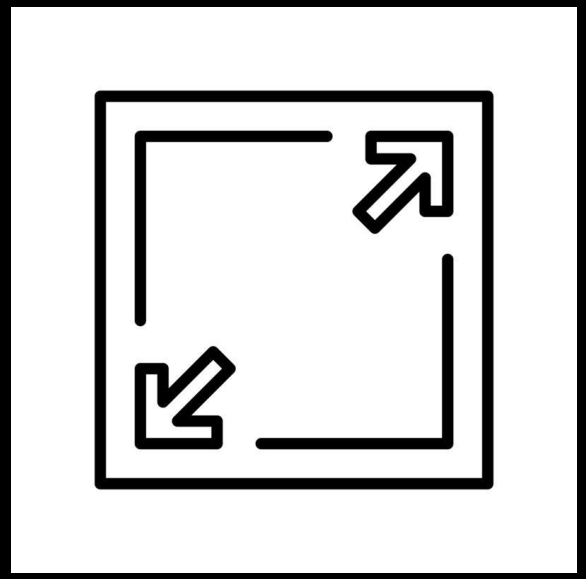
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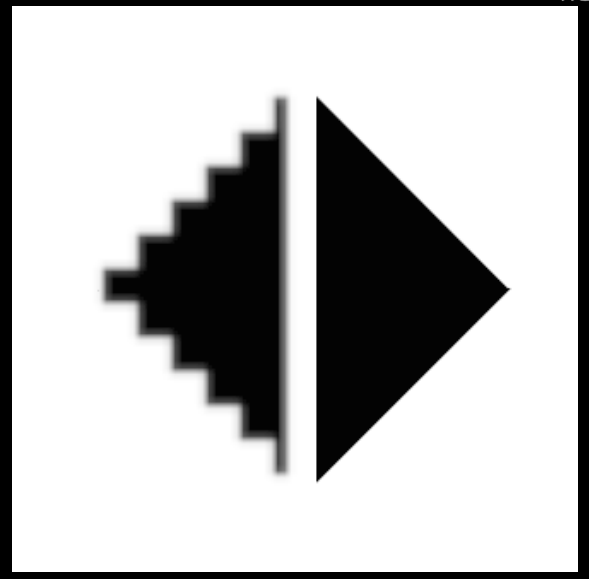
Scale versus Fidelity

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Scale

+



Fidelity



AWS SimSpace
WEAVER



FALCON


Manhattan, a metropolis of 1.6 million inhabitants.

End-to-end workflows: **Acquire** → Manage & Share → Simulate → Generate Data

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City Sample from Epic Games

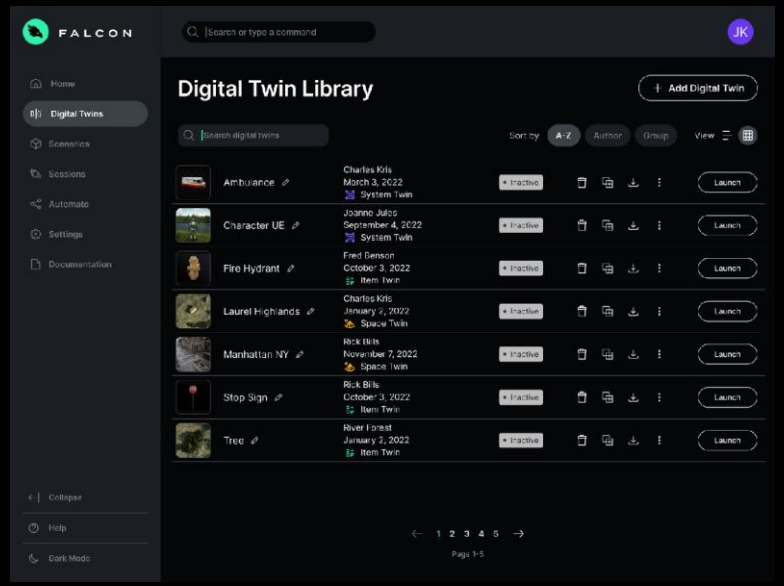
- 4 km x 5 km
- 260 km of streets
- 7,000 unique buildings
- 100k vehicles
- High Fidelity: photorealistic assets, people, and fine detail

Procedurally generated city with Houdini

End-to-end workflows: Acquire → **Manage & Share** → Simulate → Generate Data

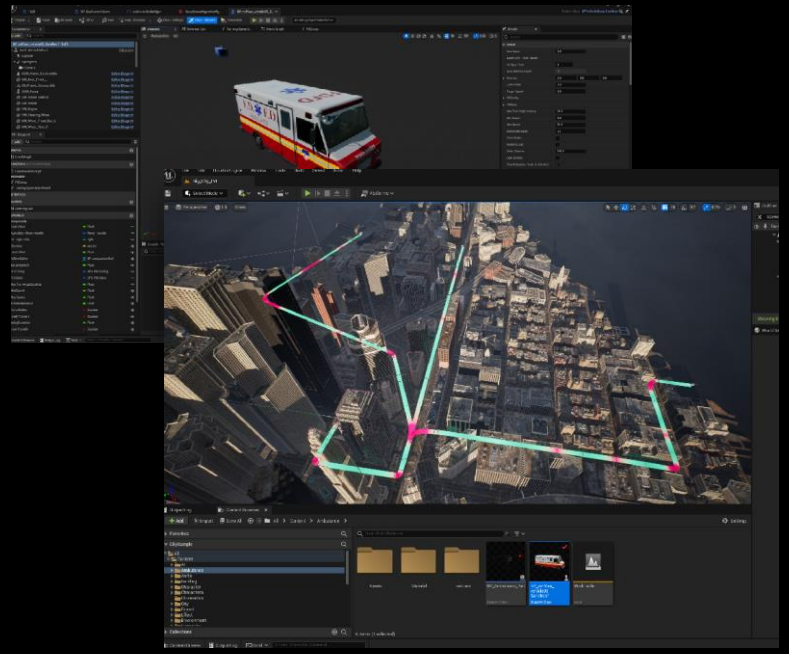
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Digital Twin Catalog



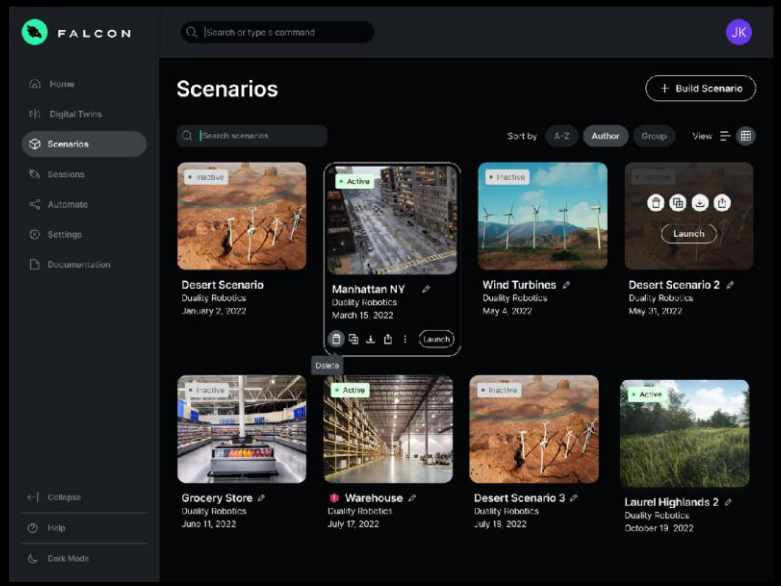
Library of all available digital twins with search, editing, and secure sharing capabilities

Scenario Editing



Flexible and comprehensive scenario editing to bring together digital twins into diverse scenarios

Scenario Catalog & Session Manager



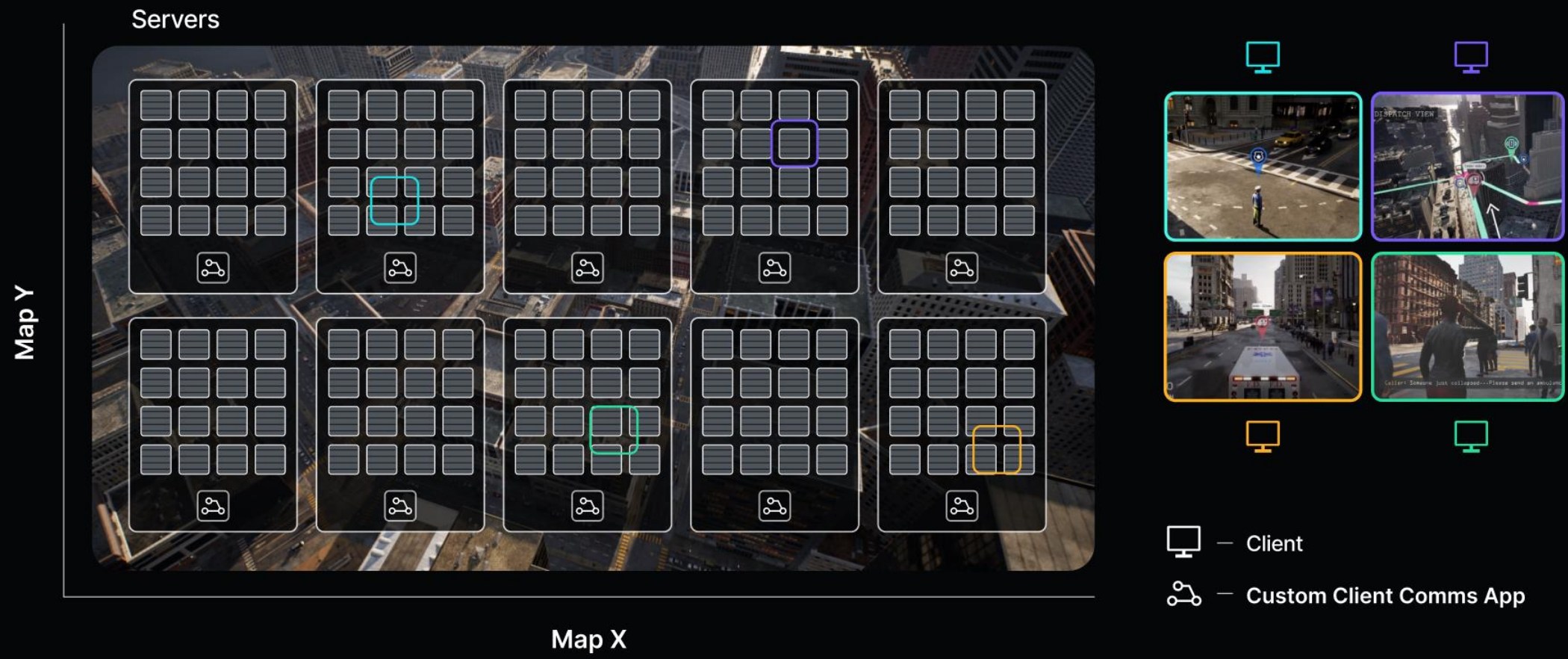
Kick off scenario simulations locally and in the cloud to generate data of interest

End-to-end workflows: Acquire → Manage & Share → **Simulate** → Generate Data

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Rush Hour Emergency and Response Simulation in Smart Cities

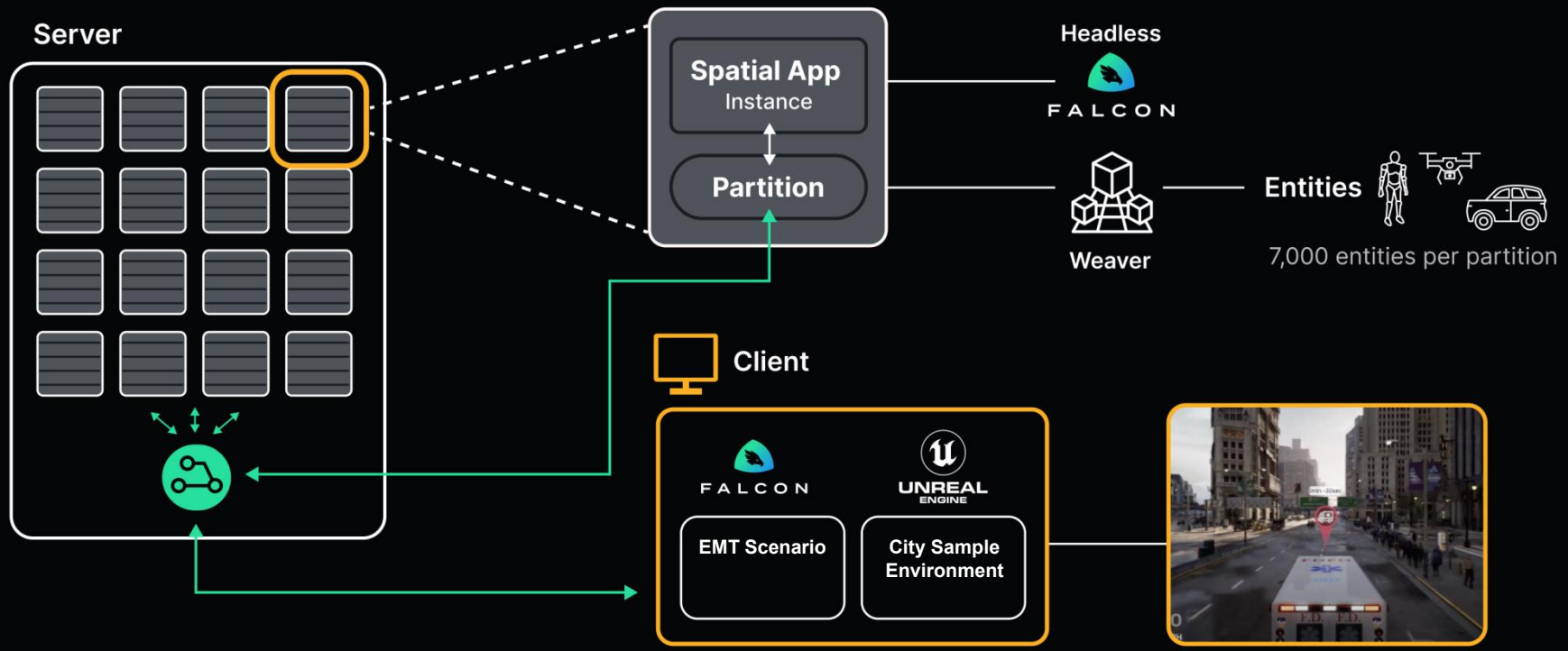
10 Server Architecture



End-to-end workflows: Acquire → Manage & Share → **Simulate** → Generate Data

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Architecture of Single AWS SimSpace Weaver Server*



States of entities within a radius of the Client character are communicated to and from the Client via the Custom Communications App

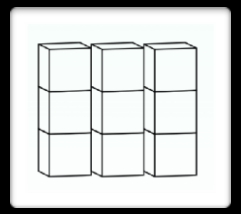
*SimSpace Weaver infrastructure extends to as many servers as required by the simulation.


Manhattan, a metropolis of 1.6 million inhabitants.

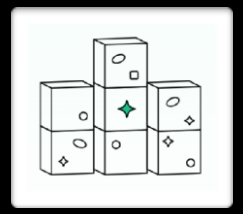
End-to-end workflows: Acquire → Manage & Share → Simulate → **Generate Data**

DUALITY ROBOTICS

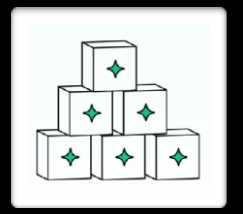
Data that is…



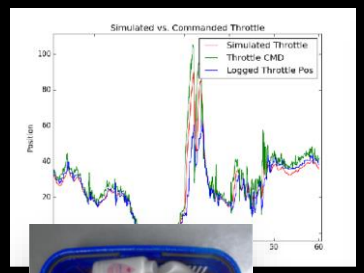
Indistinguishable

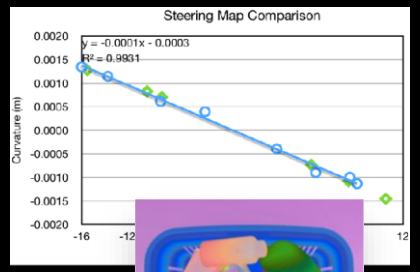


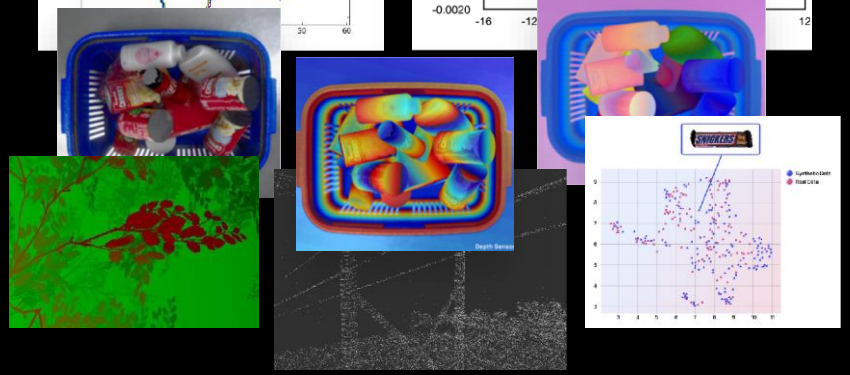
Information-Rich

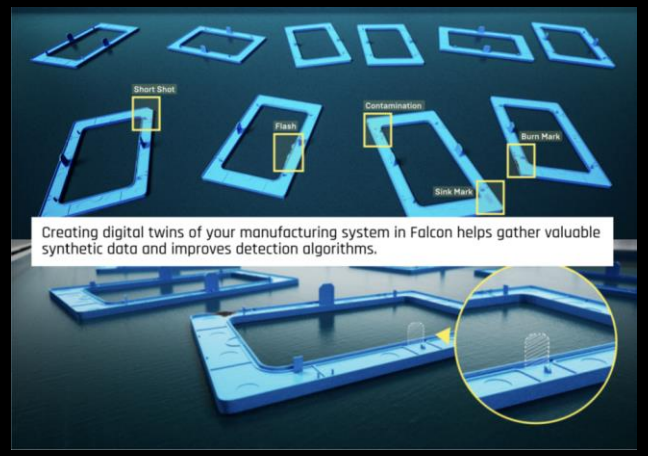


Intentional





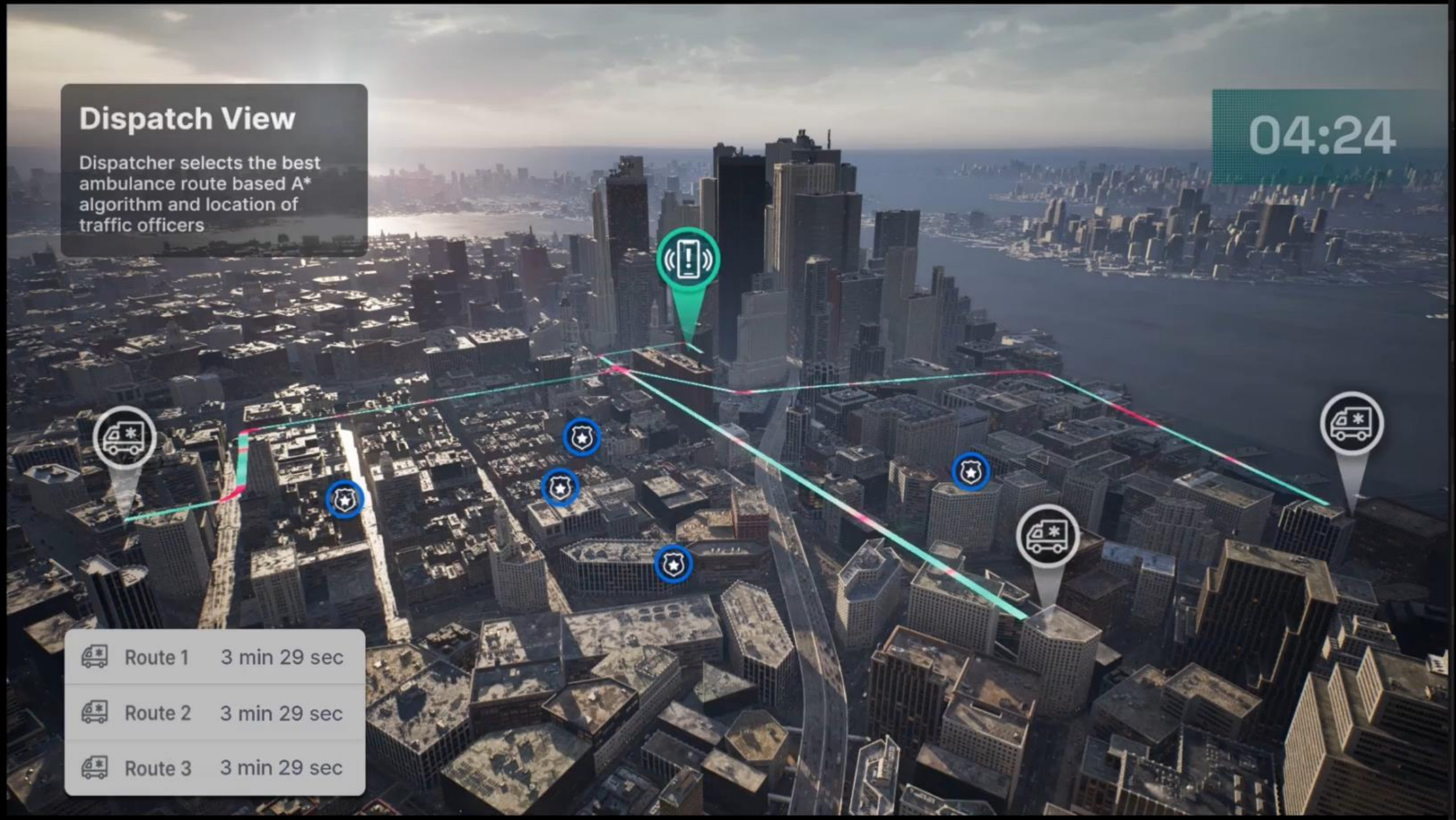






…resulting in lower data collection & annotation cost, more accurate ML models, and faster deployment of autonomous systems

3i Framework for synthetic data


Dispatch View
Dispatcher selects the best ambulance route based A* algorithm and location of traffic officers
04:24
Route 1 3 min 29 sec
Route 2 3 min 29 sec
Route 3 3 min 29 sec



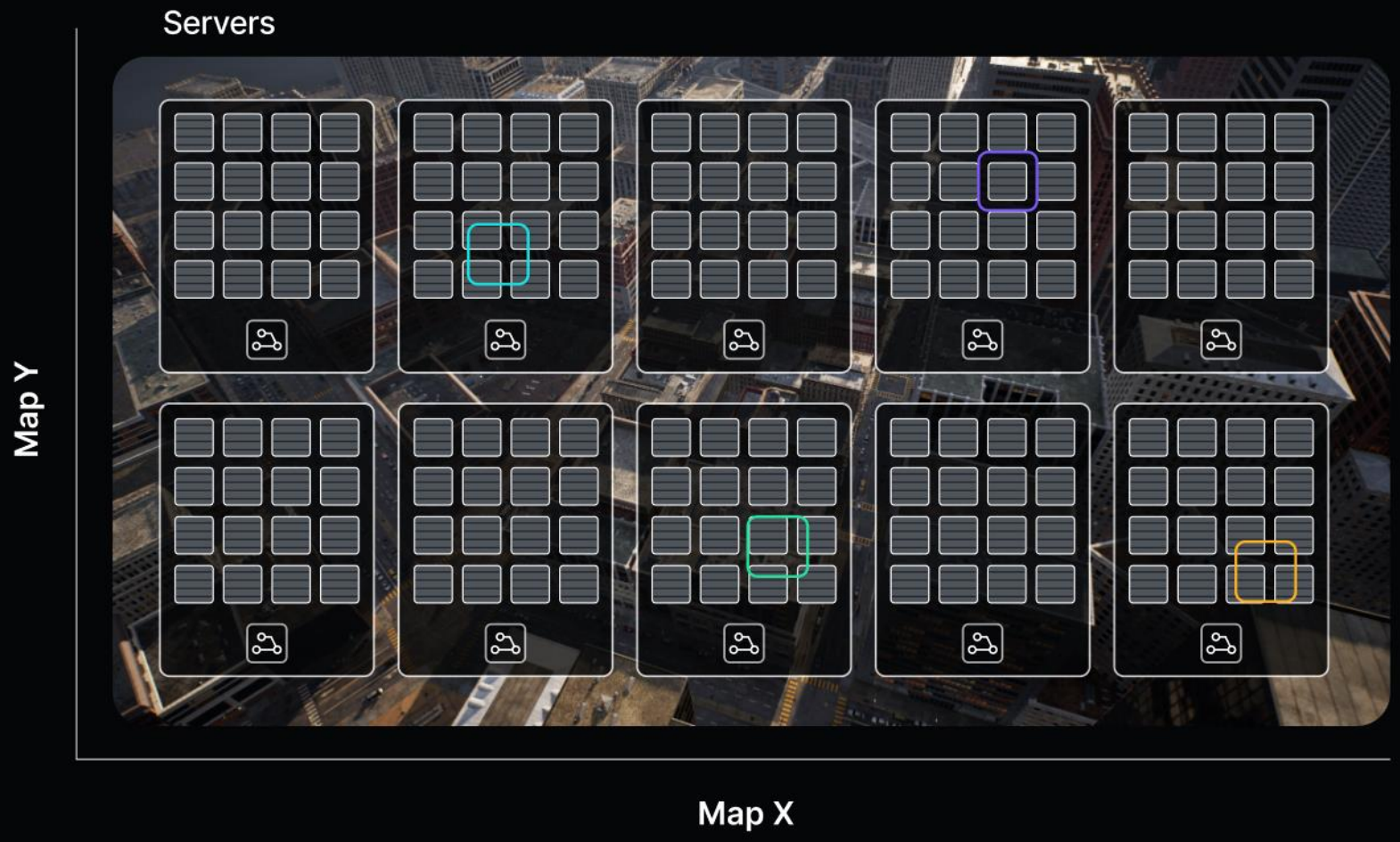

02:36
0min 21sec
FDFD
W Throttle
A D Switch Lanes
S Brake / Reverse
Z Sensor Views
Tab Lights
Space Siren
007 /030
MPH

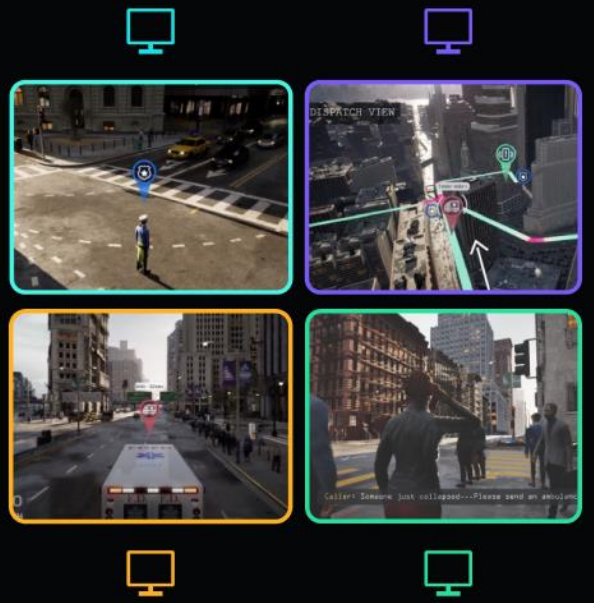

IMU
Position
X: -122,185.25
Y: -65,705.039
Z: 59.956
Color
Depth
FDFD
087
F.D.
F.D.
AMBULANCE


STOP
STOP
SLOW LEFT
SLOW RIGHT
STOP

Rush Hour Emergency and Response Simulation in Smart Cities

10 Server Architecture

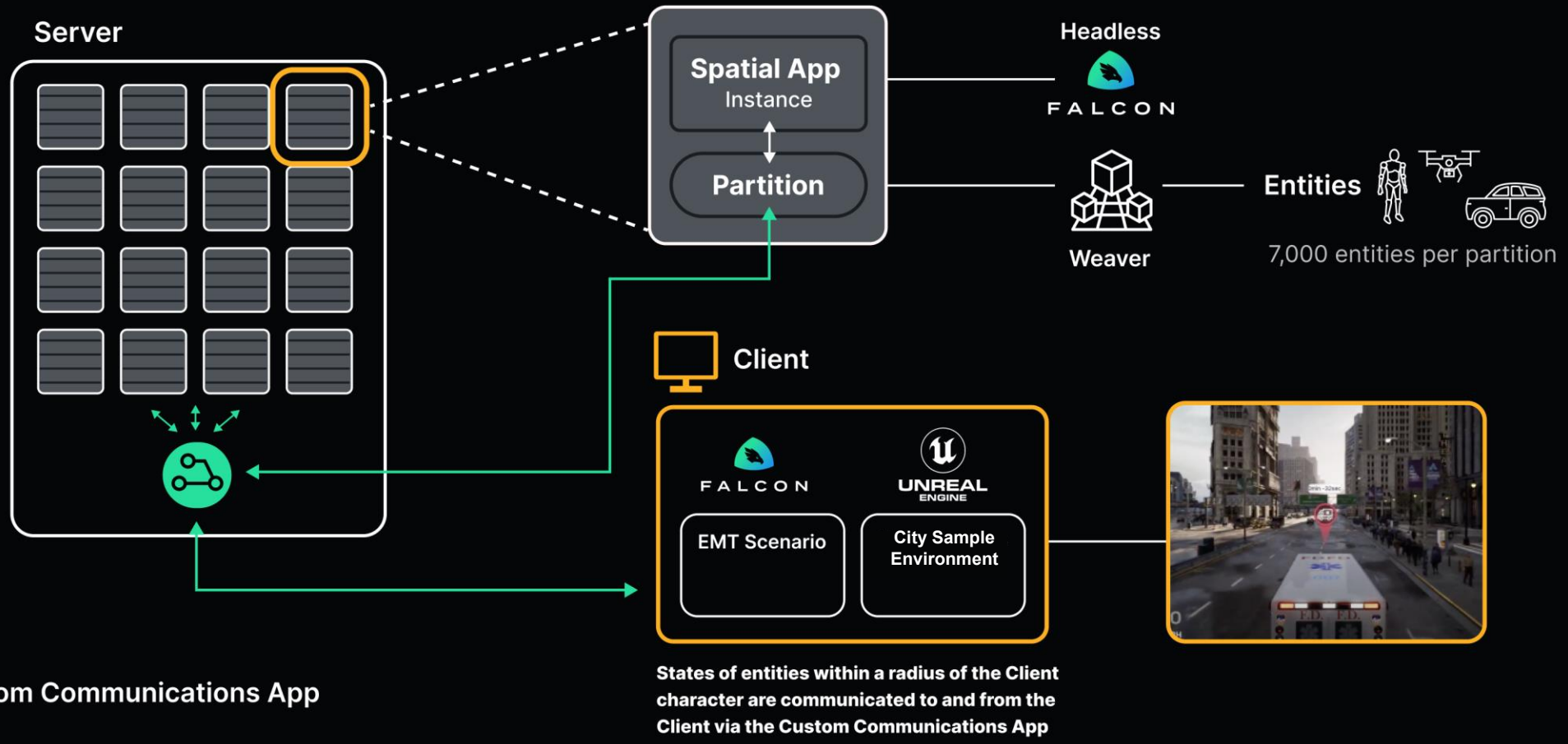




Client

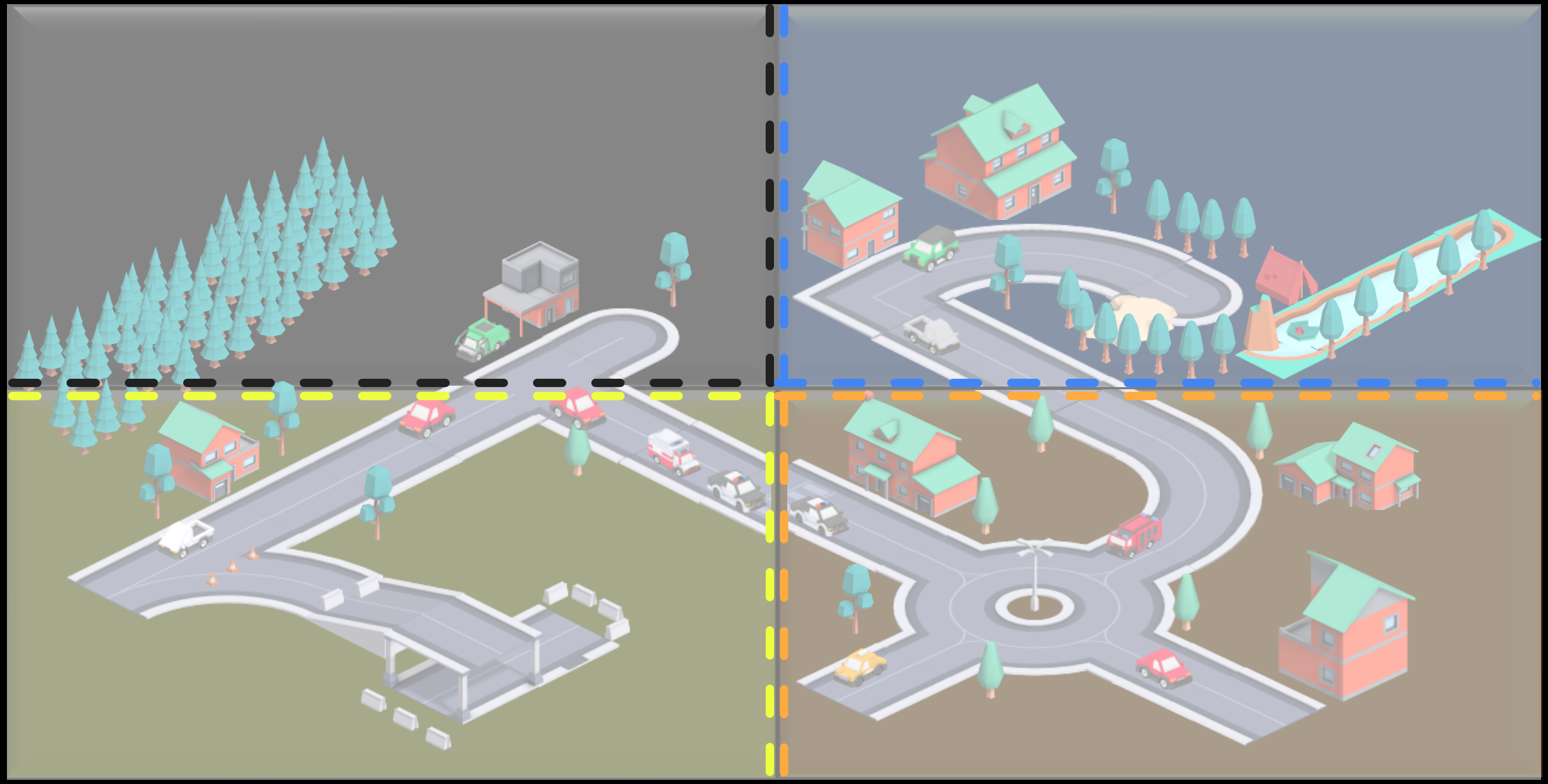
Custom Client Comms App

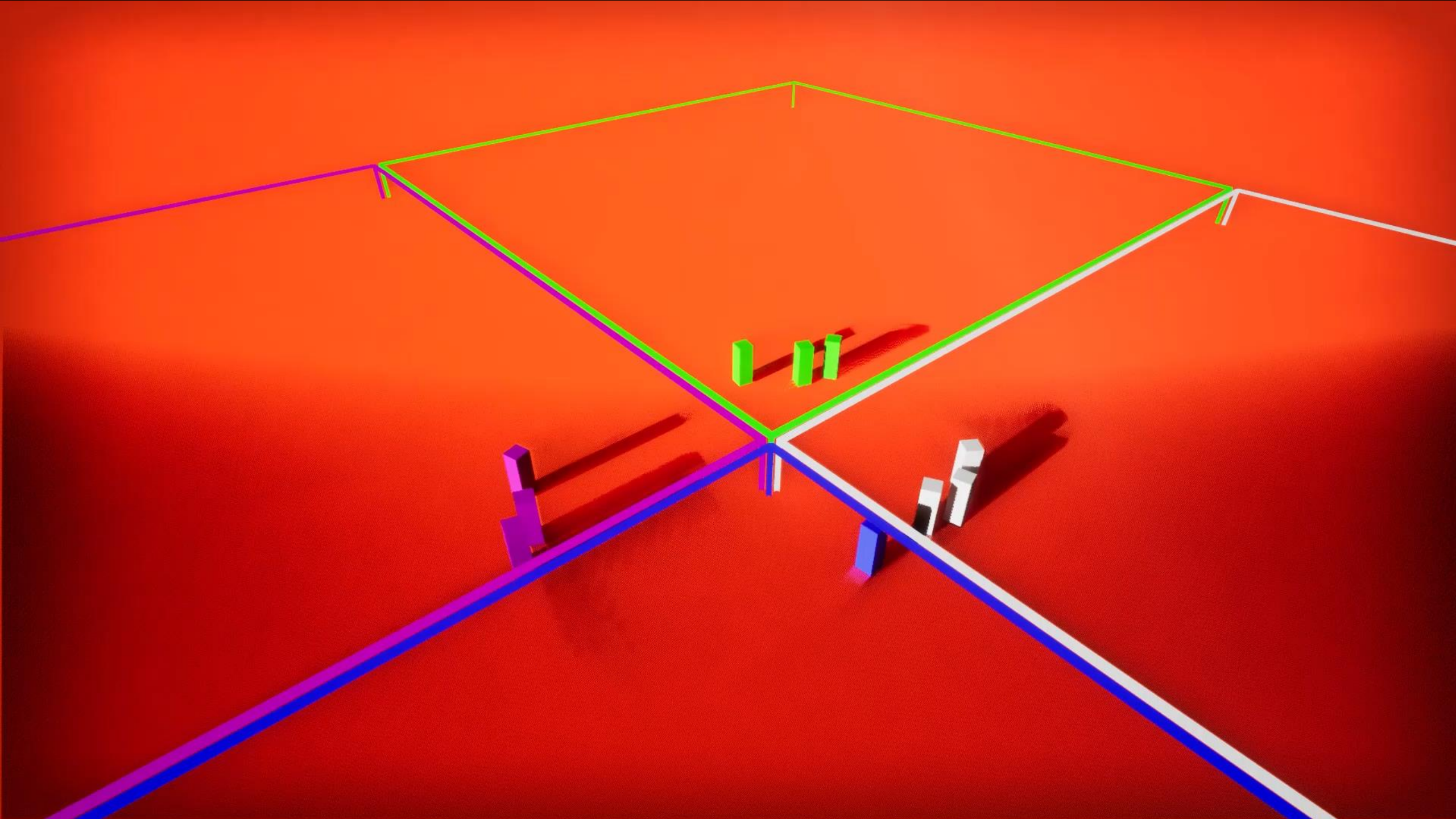
Architecture of Single AWS SimSpace Weaver Server*



*SimSpace Weaver infrastructure extends to as many servers as required by the simulation.

Subscriptions





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Thank you!



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aws

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