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The Production of Cloud
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Digital Sovereignty

# Home Cloud: Bringing Data Back to the End-User

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Today’s digital infrastructure is centralized, with data controlled by a few global providers. Home Cloud offers a structural and political solution where data stays at home. By embedding digital infrastructure directly into residential buildings, Residents gain more self-determination over their own data and digital environment.

Our Home Cloud proposal introduces on-site server infrastructure in new residential buildings that residents use directly for storage, services, and AI applications. These decentralized systems are connected through local networks, while excess capacity can be leased to local clients. This creates a local digital market that empowers small parties and helps finance the system, retaining value creation in the community and reducing reliance on centralized cloud providers.

NAME DATA CENTRE: Metro-Campus Zürich West
COMMUNE: Lupfig, AG
TYPE DATA CENTRE: Colocation/Hyperscale-ready
CAPACITY: 40 MW
OPERATOR: Green Datacenter AG
YEAR: 2020
STATUS: Partly completed
WASTE HEAT USE: District heating/planned waste-heat recovery

# Our Data on Their Servers

Who controls our data, and what risks emerge from the growing complexity in the digital landscape? In Switzerland, digital regulation remains relatively limited despite growing concerns about sovereignty and control over critical infrastructure.

Video essay *Digital Sovereignty: Integrating End Users into the Chain*, 2026
https://youtu.be/hLkMNU6PjBU

International debates on digital sovereignty are increasingly shaped by geopolitical dependencies and regulatory conflicts. While the US Cloud Act enables authorities to access data stored abroad, European initiatives such as Gaia-X attempt to establish interoperable and transparent digital infrastructures with greater strategic independence from dominant US providers.

In Switzerland, digital regulation remains comparatively limited despite growing concerns about sovereignty and control over critical infrastructure. The Swiss Federal Council has therefore initiated an interdepartmental working group tasked with developing proposals to strengthen digital sovereignty by 2027.

At the same time, the amount and sensitivity of personal data continue to expand rapidly through digital services, profiling, and AI-driven systems. Rising cases of data theft, phishing, and cybercrime demonstrate how centralised and opaque infrastructures increasingly expose individuals to security risks and loss of control over their personal information.

As a small experiment within our studio class, we explored how easily personal information can be collected through digital tools. By sharing a simple link, we were able to obtain approximate location data from students who opened it without them even noticing, demonstrating how simple it is to collect sensitive user data.

A small experiment: how easily can we collect personal information about our colleagues? This map shows the location tracking of our colleagues on April 7, 2026.

# The Home Cloud Act

Strengthening digital sovereignty starts by returning control over data to the end users. The Home Cloud Act supports this goal by introducing decentralised server networks as a standard feature in newly-built housing.

Our proposal is inspired by the Swiss Civil Protection Act, which guarantees every household access to a protective physical safe space. We translate this idea into the digital age by providing also a digital safe space, proposing decentralised household server infrastructure as a new form of collective protection. Integrated into homes and buildings, these servers provide local data storage and computing power while forming a resilient national network that strengthens Switzerland's digital sovereignty and reduces dependence on global cloud providers.

Current digital infrastructures are largely controlled by centralised corporations, while users simultaneously finance these systems and surrender personal data. The Home Cloud proposes a decentralised alternative in which data, storage, and digital value creation remain locally embedded within communities.

The proposed framework establishes Home Cloud infrastructure as part of new buildings and major renovations, enabling residents to store and process data directly at home. It further defines rights to transparency, access control, and adequate computational capacity while ensuring long-term maintenance of the infrastructure.

To support implementation, the system combines public coordination, technical standards, and regulatory enforcement. Education, installation consulting, minimum capacity requirements, and building permit regulations create the structural conditions for a resilient and decentralised digital network.

Home Cloud as a micro data centre to decrease dependency from tech companies.

Today, households depend on large centralised data centers and continuously pay for cloud storage, computing power and digital services, while the profits remain with global tech companies. Our proposal reverses this relationship. By integrating decentralised servers directly into residential buildings, households become active providers of storage and computing infrastructure themselves. Instead of only consuming digital services, residents can participate in and profit from the network through shared resources, local data ownership and the rental of unused capacity. The system transforms citizens from dependent users into stakeholders of the digital infrastructure.

# Home Cloud Can Be a Small Business

Beyond digital sovereignty, Home Cloud can also function as a source of revenue. As a scalable business model, server installations can be financed through shared use and local services.

To better understand the technical requirements and costs of a decentralised Home Cloud system, we assembled a prototype infrastructure using commercially available components. The resulting setup provided an estimate of the hardware investment needed for local server integration within residential buildings. Based on these costs, we developed different scenarios to explore how shared infrastructure and local digital services could make the system economically viable.

Component costs for home server (prices from Galaxus).

Optimising the Home Cloud with our Grasshopper script, which calculates the economic feasibility of the system by estimating amortisation on initial investment costs, operational expenses, and potential revenues. Second, it optimises the server configuration according to the number of users and their individual needs through an evolutionary solver.

To evaluate the performance of the Home Cloud system, we developed a computational workflow using Grasshopper and Python. The script combines economic calculations with evolutionary optimisation to explore how decentralised server infrastructure can become both technically efficient and financially sustainable.

The Grasshopper script serves two main purposes within the project. First, it calculates the economic feasibility of the system by estimating the amortisation time based on initial investment costs, operational expenses and potential revenues. Second, it optimises the server configuration according to the number of users and their individual needs through an evolutionary solver.

Amortisation of the Home Cloud in relation to the number of residents: while smaller systems require higher investments per person, larger shared infrastructures distribute costs more efficiently and generate greater long-term savings and revenues.

# Home Cloud at Different Scales: Small, Medium, Large

We propose three spatial typologies of decentralised server infrastructure at different scales: a small shared system for 4 people in a single-family house, a medium-scale system for 30 people in an apartment building, and a larger neighbourhood solution for around 100 people. Each typology investigates how server infrastructure can be integrated into residential architecture while balancing private use, shared digital services, energy consumption, and economic feasibility. By comparing these scales, the project analyses how larger shared systems increase efficiency, reduce costs per user, and improve the overall resilience of the network.

Three representative typologies for broad scales and uses.

Using recently constructed and renovated buildings as a reference, the investigation examines how a decentralized Home Cloud network could gradually integrate into the existing urban fabric of Zurich through future construction and renovation cycles. It explores how residential server infrastructure could progressively emerge across the city and become embedded within everyday architecture and infrastructure systems

Potentials for new Home Clouds: recently constructed or renovated buildings in the city of Zurich.

Construction year until 2016

Construction year 2016–2026

# How We Implement Our Home Cloud

Building on existing infrastructure, modular server systems are integrated into residential buildings. Digital infrastructure thereby becomes part of the architectural and technical systems of the home, transforming the house into both a living space and an active node within a decentralised national data network.

The decentralised household server system is integrated into a residential building and connected to public infrastructure. The rack provides storage, compute servers, local AI services, network switching, and private cloud functions for the household. Through the modem, firewall and power distribution unit, the system connects to the building's LAN and WLAN network, enabling all residents and devices within the house to access digital services locally. Digital infrastructure becomes part of the architectural and technical systems of the home, transforming the house into both a living space and an active node within a decentralised national data network.

Schematic section of the Home Cloud infrastructure.

Server integrated in a utility room.

Server integrated in mailbox.

A common server infrastructure,
like washing machines.

Server integrated in a kitchen.

Servers integrated in a common garage.

Switzerland already benefits from a dense fibre optic network across urban and residential areas. The decentralised Home Cloud system builds upon existing infrastructure and connects local server nodes directly to current utility networks. In this map, the fiber optic connections were simulated to visualise a possible decentralised Home Cloud network structure.

- Residential buildings built between 2016 and 2026
- Industrial buildings
- Hub
- Fibre to the Home (FTTH)
- Simulated optic fibre

# Potential Waste Heat Use

Integrating server waste heat into residential technical systems could create new synergies between digital and energy infrastructure. Before reaching the main heating system, the generated heat could be used to preheat cold water, reducing the energy required for heating and hot water production. In a four-person household, this approach could potentially save up to one third of the electricity normally needed for heating, turning digital infrastructure into an active part of the building's energy system.

Potential heating through server waste heat use.

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