



Digital Asset

# Unlock the Power of Your Business with Daml

Create systems of record with a development framework that securely connects business processes across multiple entities.

### TABLE OF CONTENTS

- 03 Current business models
- 04 Leveraging smart contracts to solve complex workflows
- 05 Leveraging Daml smart contracts
- 08 Understanding Daml Drivers
- 11 Daml Driver for PostgreSQL
- 12 Daml Driver for Corda
- 13 Daml Driver for VMware Blockchain
- 14 Moving forward with Daml

# Rethink the way you do business

From internal departments to regulatory agencies, every business requires some form of transaction or data sharing with an external party. However, most transactions occur across centralized systems of record, causing businesses to constantly partake in reconciliation efforts and manual updates. These processes are not only resource and time intensive, they also create opaque business models that result in inaccurate

data and error-prone processes. Ultimately, the transactions between these systems and various parties become a burden on the organization. The inefficiencies of these multiparty workflows slows down revenue generating activities, increases internal management costs, and jeopardizes the organization's compliance with various data regulations. Consider the following industries:



## Capital Markets

Financial institutions are plagued by inefficient processes that stifle innovation, increase capital requirements, and disturb cash flow. Organizations are bound to legacy technology limited in its ability to perform and support decentralized business models that would improve efficiencies across KYC to clearing and settlement and corporate actions. For example, securities services consist of intermediaries across local and global markets operating their own infrastructure. These data silos delay trades, incur significant operational expenses from reconciliation processes, and increase custody risk. These disparate platforms must evolve to support data sharing with external parties via a highly secure, future-proof framework with the ability to move across platforms and establish a common foundation for innovation.

Learn how to improve capital market multiparty workflows here →



## Healthcare

Healthcare organizations are faced with the challenge of sharing patient data in an efficient, accurate and compliant manner; however, most healthcare systems run across technology that silos information and hinders the delivery of efficient healthcare solutions. Due to a highly regulated data sharing model, manual processes are employed that result in delayed payments, incorrect documentation, and a poor patient experience. Providers submit claims to payers and receive payment months later, reducing provider liquidity and increasing general healthcare costs. Pharmaceutical companies operate with minimal visibility into the drug supply chain and operate clinical trials without a complete patient history record. Healthcare systems must identify how to securely share patient data to optimize payments, care, and drug creation.

Learn how to improve healthcare multiparty workflows here →



## Supply Chain

Global supply chains are complex and involve multiple parties with competing interests each running on a segregated system of record. A single supply chain can span hundreds of stages and cross several international boundaries, creating a perfect place for suspicious actors to impose counterfeit goods. For example, the external parties involved with the supply, production, and distribution of goods are international in scope and run on disparate systems, causing gaps in data related to the quality of goods and origin. Once an order is placed by a business, there is no insight into the actual ingredients, authenticity of goods, or production quality. In order to transact more efficiently with full visibility, all supply chain participants must identify a method of sharing sensitive data across multiple platforms.

Learn how to improve supply chain multiparty workflows here →

# A solution to cross boundaries and form seamless economic networks

While many of the systems underpinning financial services, healthcare, and supply chain create error-prone, manual processes, there is significant opportunity for businesses to digitally transform and transact more efficiently through the use of smart contracts, the framework that enables distributed applications to operate across distributed ledgers (DLT) and blockchains. Smart contracts provide stakeholders a consistent view of business transactions based on the rights and obligations defined within the contract (code). Each entity in a multiparty workflow differs in their rights and obligations, and smart contracts ensure that distributed applications share the right information to the right party at the right time.

This decentralized communication allows data sharing, payments, and more with internal and external parties. Unfortunately, many of the smart contracts underpinning today's blockchains and distributed ledgers (DLT) are not conducive with rapid adoption or implementation. Most smart contracts are tied to a single platform and require a large up-front investment in blockchain or distributed ledger technology. They do not have the ability to deploy across current infrastructure, require a development team familiar with both the language and the underlying system, and lack interoperability between systems that have yet to adopt DLT or blockchain.

To complicate matters, some businesses wish to remain on their current infrastructure and utilize traditional programming languages to solve interdepartmental or distributed workflows. This requires complex coding by developers who must understand the business requirements and smart contract logic. Traditional programming languages often lack the capabilities inherent in smart contracts,

Smart contracts enable businesses to transact in a highly secure and permissioned environment to improve complex multiparty workflows.

resulting in error-prone applications. As a result, many of these systems are complex, siloed, sequential, and fragile which makes changes or future enhancements difficult. The other option is to adopt the distributed ledger model and accompanying language; however, those models pose a risk to businesses as it locks companies into one platform that may not be optimal as requirements evolve. This also prevents a company's ability to prove out DLT investments while leveraging current infrastructure.

## Build solutions fast and connect siloed parties

**Daml, the smart contract language that connects business stakeholders while retaining privacy, guaranteeing data integrity, and enforcing strict authorization across any infrastructure.**

Daml, a platform agnostic smart contract language that simplifies complex multiparty workflows through a development framework designed to securely connect businesses, addresses and solves these problems. Through Daml, businesses can rapidly build and implement solutions that address the complexities and nuances of multiparty workflows. Daml gives businesses choice by supporting both distributed ledgers and databases, offering true cross-platform interoperability, delivering full application portability, and much more.

**Digital Asset**

# Daml simplifies every aspect of your business

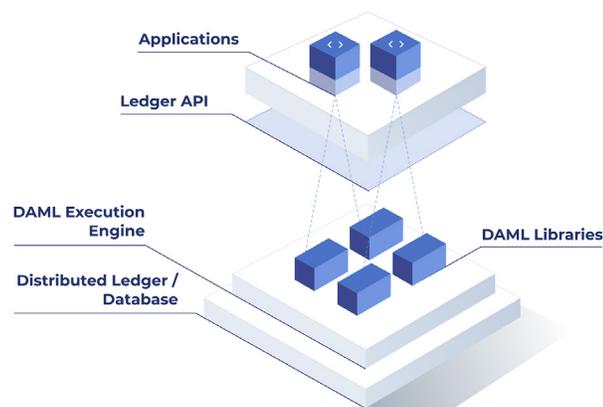
Tear down multiparty data silos with smart contracts.

Daml smart contracts enable businesses to seamlessly connect  
and establish a common foundation for innovation.

# Build interconnected business models with Daml

Daml is a development framework that provides a smart contract language, runtime system, and integrations with various persistence layers to help companies build multiparty workflows that improve collaboration across business processes and tear down data boundaries. Daml automates repetitive tasks and manual workflows, freeing up resources for projects that contribute to the bottom line. This innovative framework empowers business domain experts to rapidly create interoperable multiparty applications that adhere to strict data regulations, only sharing information with the parties who have specific rights to view the data. Daml is open-source and platform agnostic so businesses can decentralize distributed processes regardless of the underlying infrastructure.

Leverage Daml smart contracts to create fully portable and interoperable applications that can be used again and again across any technology stack.



# A smart contract framework focused on application development

Daml is unique in the distributed ledger space as it focuses solely on application development. Daml completely abstracts away the underlying infrastructure, so developers can focus on writing business logic without the burden of interweaving complex systems code. Before Daml, developers had to either write smart contract logic into applications using traditional programming languages (an error-prone and fragile method) or build applications using low level smart contracts and APIs tied to the internal mechanics of its underlying DLT platform.

The kinds of data the distributed ledger or database can store and the rules that govern the data are specified in Daml smart contracts. That smart contract logic is then deployed through the Daml Ledger API. The Daml Ledger API is a high performance gRPC-based streaming API that exposes a virtual shared Daml ledger (DLT or database) to applications. To enable a distributed ledger or database to run Daml applications, a Daml Driver must be purchased (see page 13 for more information).

Daml also abstracts away cryptographic signatures, transactions, and addresses, along with high-level concepts such as data ownership, visibility, permissions, and write authorization in the code itself. Developers simply need to define which entity receives what data and only code the business logic. Other features include:

- Granular privacy model with sub-transaction level privacy
- True cross-platform interoperability so businesses can maintain atomicity across networks and tech platforms
- Complete application portability between distributed ledgers and databases so the application can evolve with your business
- See the full list of features here →

**Digital Asset**

# Daml provides highly secure and interoperable applications

Connect businesses across network boundaries without losing key system properties and privacy.

Daml employs data minimization principles across a privacy-first framework and offers true cross-platform interoperability.

# A more granular privacy model achieved through Daml

Daml ensures data is only visible to those who have a right to see the data through sub-transaction level privacy at the API. Transactions can also be blinded from the network operator. With fine-grained permissions, Daml-driven applications will specify who is allowed to authorize a given contract step and who can view the contract data.

Since Daml transactions are composed of sub-transactions, every sub-transaction has its own set of witnesses entitled to see their part of the smart contract. For example, if two entities swap \$100 USD at Bank A for Product B at Company X, then the transaction will occur atomically with Bank A only seeing the cash transfer and Company X only seeing the transfer of Product B. The set of witnesses depend on the current transaction only for a predictable and safe model.

Daml smart contracts eliminate trade-offs between consistency and privacy through a privacy-first framework that enforces data minimization standards at the sub-transaction level.

The full data minimization privacy model is provided in all integrations; however, if Daml is deployed to a centralized SQL database, then the database operator will have access to the least encrypted version of the transaction.

In addition to its privacy-first framework, Daml also supports test driven application development by alerting developers of inconsistencies in their business logic. As developers code the smart contract, Daml ensures the smart contract expresses the intended workflow properly.

---

“...Daml can manage complex multiparty workflows better than other smart contracting languages. As we develop the CHES replacement system based on [Digital Asset] technology at ASX, the open sourcing of Daml will accelerate the creation of a software developer community in Australia and the adoption of Daml globally.”

- PETER HIOM, Deputy CEO

---

## True cross-platform and smart contract interoperability

In addition to a highly secure and private framework, Daml also enables different Daml-based ledgers and databases to interoperate using the Canton synchronization protocol, creating a virtual global ledger where workflows and assets can freely move between platforms. Canton features the following capabilities:

- Global composability, i.e. different Daml-based ledgers (DLT and database) can interoperate using the Canton protocol without risking a fork or lock-in.
- Complete GDPR compliance and data privacy as the protocol was built around the principle of data minimization and the right to forget.
- Ensures the ledger is always in a valid state and a corrupted state never occurs.
- No upper bound on how many transactions per second it can process and can be scaled to achieve any transaction processing speed.

Canton guarantees that data is reliably shared only with entitled parties in a way that is always correct, even in the presence of malicious actors. Canton's topology can be extended without friction with new parties, ledgers and databases, and applications, building on other solutions without requiring a central managing entity or global consensus within the network.

**Digital Asset**

# Future proof your tech investment with Daml Drivers

Daml eliminates vendor lock-in by providing full application portability across supported ledgers and databases.

Daml Drivers enable developers to write Daml code once and deploy anywhere with full application portability.

# Run Daml driven applications on enterprise-grade persistence layers

Many organizations have significant investment in both time and outstanding software licenses for their existing infrastructure. This limits the frameworks developers and business domain experts can leverage for new projects, meaning multiparty workflow projects are either deferred or rewritten when migrated from traditional infrastructure to distributed ledger platforms. With the Daml ecosystem, businesses can leverage a suite of integrations called Daml Drivers that enable developers to deploy applications leveraging Daml smart contracts across a variety of persistence layers. The same Daml application running on a PostgreSQL-compliant database can be migrated to a Daml-enabled ledger such as Corda or VMware Blockchain with no code changes. When external counterparties want to store a copy of the data they are entitled to, developers can redeploy the Daml application onto a distributed ledger and enable users to run their own DLT node - all without rewriting the application.

All Daml driven applications are ledger agnostic so businesses can leverage the latest DLT platforms and the features accompanying the infrastructure providers without having to make changes to the Daml application. Daml enables businesses to focus on creating new value for their business without the worry of code rewrites and evolving roadmaps that impact the underlying infrastructure.

Additional benefits to using Daml Drivers include:

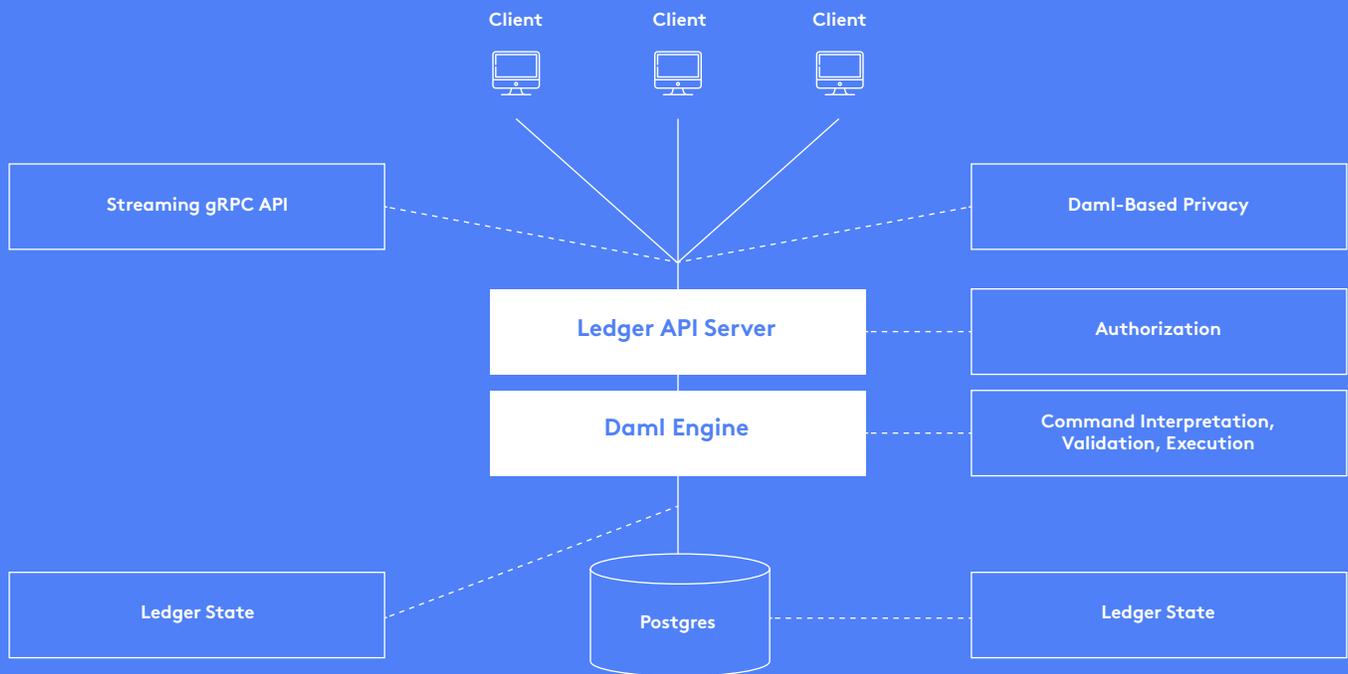
- Completely decoupled Daml code from the underlying ledger, abstracting away the complexity of DLT.
- Ledger agnostic Daml applications that will not break nor require a code rewrite when migrated to new infrastructure.
- Single Daml Driver license entitlement that provides the freedom to move applications to any supported ledger or database using the Daml Driver license entitlement.
- Support across any PostgreSQL compliant database, Corda, and VMware Blockchain.

With the Daml Driver license, you can deploy your application across distributed ledgers or databases, and port the application with no code change when business needs change.



# Daml Driver for PostgreSQL

Improve collaboration and automate repeatable workflows with multiparty applications on any PostgreSQL-compliant database. Daml Drivers enable developers to write Daml code once and deploy anywhere with full application portability.



**Build innovative applications with ease** as Daml applications only require developers to write business logic. The infrastructure and database integrations are managed through the DAML ecosystem.



**Migrate applications at any time to your system of choice with full application portability.** Daml supports on-premises or on cloud database deployments (AWS, Aurora, GCP).



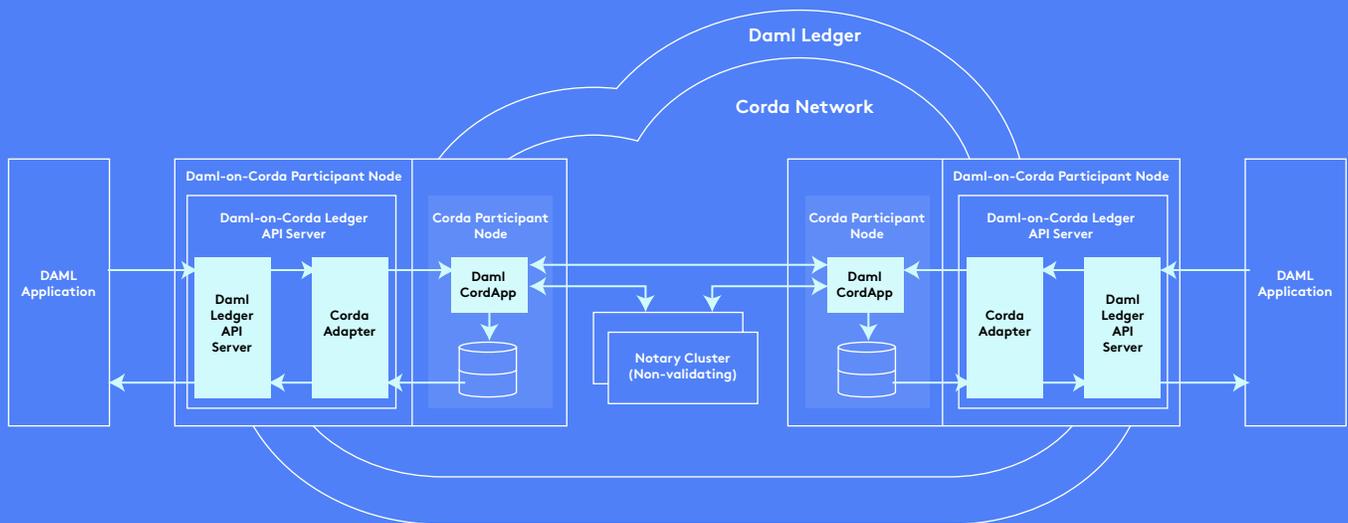
**Specify who signs, acts, and views various contracts with fine-grained permissions.** Daml ensures data is only visible to those who have a right to see the data.



**Deploy to any PostgreSQL compliant database** - leverage your existing on-prem, own-cloud and public cloud investments. Run standalone or deploy with Kubernetes.

# Daml Driver for Corda

Pair the power and simplicity of Daml smart contracts with a privacy-enabled enterprise distributed ledger platform. Daml Drivers enable developers to write Daml code once and deploy anywhere with full application portability.



**Privacy by Design** ensures data is only visible to those who have a right to see the data while blinding transactions from the network operator



**Deploy on existing Corda networks** since Daml for Corda is built as a standard CordApp and can even run side by side with native Corda applications



**Enforce an offer-accept pattern** with Daml contracts which only allows choices that result in well authorized valid states



**Run existing Daml apps on Corda**, including the integration logic since Daml applications are fully portable across any Daml enabled ledger



**Improve developer efficiency and reduce errors** by having Daml for Corda automatically generate Corda flows for Daml applications

# Daml Driver for VMware Blockchain

Pair the power and simplicity of Daml smart contracts with a privacy-enabled enterprise distributed ledger platform. Daml Drivers enable developers to write Daml code once and deploy anywhere with full application portability.

The screenshot shows the VMware Blockchain dashboard with the following data:

- Node Health:** 7/7 (represented by a green circle)
- Organizations:** 5
- Current Block:** 1,200
- Deployed Contracts:** 120
- Transactions:** 1,202

**Nodes Table:**

Name	Address	Network Status
org1-node1	192.168.128.8:3501	HEALTHY
org1-node2	192.168.128.8:3501	HEALTHY
org3-node3	192.168.128.8:3501	HEALTHY
org4-node4	192.168.128.8:3501	HEALTHY
org4-node5	192.168.128.8:3501	HEALTHY
org4-node6	192.168.128.8:3501	HEALTHY
org5-node7	192.168.128.8:3501	HEALTHY

**Activity Table:**

Action	Description	When
Node Started	Start up successful	2018-11-28T16:25:56
Node Upgraded	Upgraded from v1.2 to v1.2.3 successfully	2018-11-28T16:25:56
Node Stopped	Successful	2018-11-28T16:25:56
Node Created	Creation successful, took 2:30.	2018-11-28T16:25:56
Node Transferred	Transferred To Acme Inc.	2018-11-28T16:25:56
Org Invited	admin@org invited user@company	2018-11-28T16:25:56
User Login	admin@blockchain logged in	2018-11-28T16:25:56



**Use Scalable Byzantine Fault Tolerance (SBFT)** consensus to ensure integrity of data in the blockchain and protect against faults and malicious actors.



**Focus on Day 2 Operations** with management, deployment, and monitoring built into the platform for simpler provisioning, comprehensive metrics and logs, and 24x7 global support



**Rely on sub-transaction level privacy** at the infrastructure layer with data distribution rules automatically determined by the Daml Runtime



**Integrate with current SDDC infrastructure** and scale across multiple data centers in public, private and hybrid environments



**Model and enforce multiparty agreements** with Daml smart contracts while leveraging the Daml SDK tooling to integrate with existing systems

Digital Asset

# All you need to see the Daml difference across your business

Whether you're joining an existing network or starting a new network, you will need to purchase the Daml runtime and enterprise support as well as a Daml Driver license to deploy across your infrastructure of choice.

If you want Digital Asset to manage the infrastructure for you, you will need to deploy your open source DAML project on Daml Hub.

SUPPORTED PERSISTENCE LAYERS FOR DAML-DRIVEN APPLICATIONS

vmware

HYPERLEDGER  
FABRIC

HYPERLEDGER  
SAWTOOTH

HYPERLEDGER  
BESU

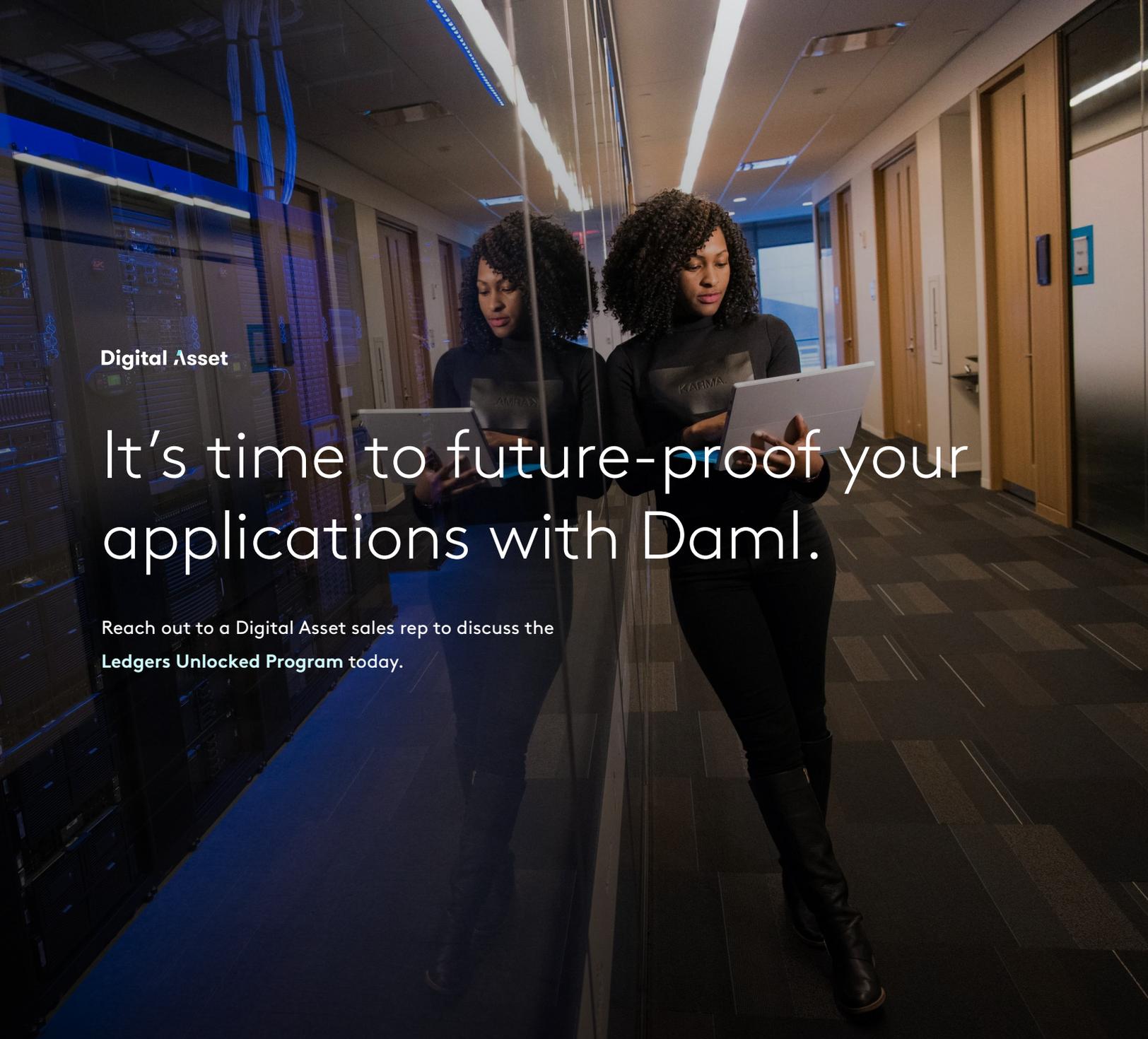
project:DABL

PostgreSQL

c·rda

Amazon  
Aurora

Amazon Quantum  
Ledger Database

A photograph of two women with curly hair, wearing dark clothing, standing in a server room. They are both looking at tablets. The woman on the right has 'KARMA' written on her top. The room is filled with server racks and has a blue ambient light. The background shows a hallway with wooden doors.

Digital Asset

# It's time to future-proof your applications with Daml.

Reach out to a Digital Asset sales rep to discuss the **Ledgers Unlocked Program** today.

## Ready to get started?

We have a few enterprise subscriptions ready for you to suit your needs, from proof of concepts, prototypes, to production solutions.

[PICK THE PLAN](#)



## Want to see more?

We'd love to show you the Daml difference first hand with an in-depth demo and overview of what Daml can do.

[TALK TO SALES](#)

