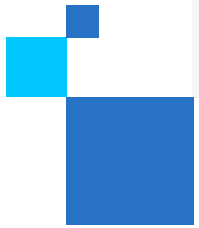
November 2023

Confidential Computing ISV Enablement Package

How ISVs can address customers' business challenges with Intel based solutions

What is Confidential Computing?



What is Confidential Computing?

Confidential Computing allows for the extraction of insights or training of AI models using sensitive data without exposing that data to other software, collaborators or your cloud provider

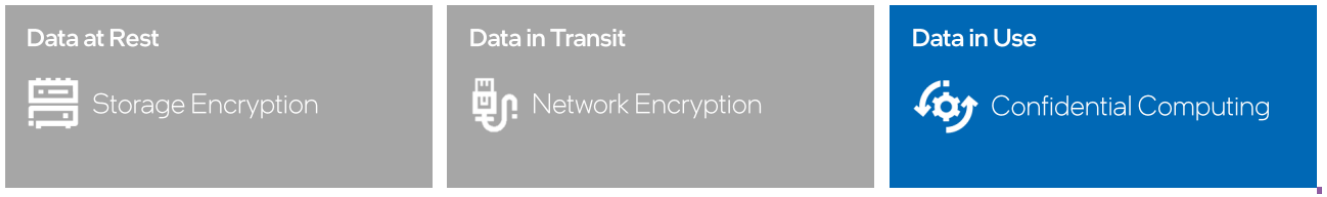
This provides an array of possibilities for businesses to harness data that was previously too sensitive or regulated to activate for analytics and other purposes

The **confidential computing** software segment is expected to be the **largest** and **fastest- growing market segment** followed by hardware and services

In just a few short years, **confidential computing has gained wide attention and momentum as a powerful new way to provide end-to-end protection of in-use code and data**

The Need for Confidential Computing

Closes a major gap in the Data Protection Continuum



Everest Group®

According to the Everest Group, this "next frontier in data security … is poised for exponential growth." The global market, $1.9 billion in 2021, is expected to grow at a compounded annual rate of 40% - 95% through 2026, driven by cloud and security projects.

Confidential Computing

Sectors & Use Cases

Sectors

Use Cases

Confidential Computing

Key AI Use Case

Multi-party machine learning

Leverage the power of machine learning without compromising the confidentiality and privacy of sensitive customer data

Business Brief

Multi-party machine learning with confidential computing can be especially useful in:

Healthcare

can leverage the power of data to conduct more advanced research without exposing confidential patient information

Financial Services

can better predict potentially fraudulent activities while also fighting money laundering and the financing of terrorism

Customer Case Study

Healthcare

Collaborative Computing with Regulated Data

BeeKeeperAI™ NOVARTIS

Situation

Novartis Biome develops diagnostic models and therapies for rare diseases. Rare disease information is sparse and dispersed across multiple hospitals and research institutions

Challenge

Patient information is private and highly regulated.
Hospitals do not want to move data off-prem or disclose private records to BeeKeeperAI or Novartis

Solution

An Intel® SGX-enabled BeeKeeperAI node installed onprem at each hospital analyzes private data and updates master model weights in the cloud. Neither Novartis nor BeeKeeperAI personnel ever see or store regulated health records

BeeKeeperAI™

"[Confidential computing platforms] allow us to reduce the cycle time to validate an algorithm in half. It also cuts the costs almost in half. Those kinds of savings allow us train, validate, and bring to market generalizable algorithms much faster. And, it will only get faster and less costly as the technology and processes underlying CCP mature." MaryBeth Chalk, Co-founder and Chief Commercial Officer, BeeKeeperAI, Inc

Whitepaper

Accelerating Development of Clinical AI Algorithms

Customer Case Study

High-Security Key Protection

Fortanix®

Situation

Rapidly proliferating keys and certificates require strong protection and centralized management. HSM solutions are expensive and cloud solutions rely on CSP security and compliance.

Challenge

Build a scalable, software-based key management system with HSM-like security that is technologically isolated from its cloud host

Solution

Fortanix bases its Self-Defending KMS software on Intel® SGX to protect keys and certificates from external adversaries and the cloud provider and helps ensure the owner's secrets remain under their control

Fortanix®

Performance Remains High with Intel® SGX Enabled

Implementing a multiple-instance configuration provides significant throughput gains. These performance enhancements are minimally affected by enabling Intel® SGX, meaning that organizations can simultaneously increase security and performance.

Solution Snapshot

[Confidential AI Data Intel Security Solution - Fortanix]

PRC Customer Case Study

Mining Data Value

创邻科技 CREATE LINK

Chuanglin Technology

Situation

How to ensure the security of enterprise data and privacy is a common problem faced by database and hardware manufacturers

Challenge

Traditional data encryption technology only encrypts hard disk storage and network transmission, and its effectiveness is based on the premise that the server control authority has not been leaked. If the control of the server is intercepted, the data in use can be stolen or modified by a third party

Solution

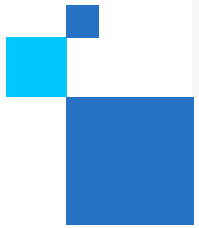
Chuanglin Technology and Intel jointly launched a graph database data encryption solution, using Intel® SGX memory encryption. It guarantees the ultimate performance of Galaxybase, thus creating a memory-safe graph database product.

创邻科技 CREATE LINK

It is believed that with the help of Intel® SGX memory encryption technology, the new-generation graph database Galaxybase created by Chuanglin Technology can provide customers with high-quality and more secure data services, efficiently realize data interconnection, and empower enterprises to realize the value of data assets in a stable manner.

Press Release

What Intel offers for Confidential Computing



Intel Offers the Most Comprehensive Portfolio

Intel® Software Guard Extensions (Intel® SGX)

Application isolation

Intel® Trust Domain Extensions (Intel® TDX)

Virtual machine isolation

Intel® Tiber™ Trust Services formerly Intel® Trust Authority

Independent trust verification services for multi-cloud & hybrid cloud

Software Solutions, Cloud, OEM and System Integrator Ecosystem

Intel Security-First Development & Lifecycle Support

*Intel® TDX available through select cloud providers

Intel Trusted Execution Environments

Application-level isolation: Intel® SGX

Advantages
- Separation from cloud provider and other tenants
- Smaller trust boundary and potential attack surface
- More amenable to code inspection and monitoring
- Deployable in VMs, cloud-native containers and bare-metal

Considerations
- Apps may require specific development or tailoring
- Frequent calls outside the enclave may impact performance

VM-level isolation: Intel® TDX

Advantages
- Separation from cloud provider and other tenants
- Lowest porting effort for existing applications
- More amenable to enterprise-wide deployment mandates
- Can be a simple instance configurator setting

Considerations
- Larger trust boundary (guest OS, all apps, VM admins)
- Possible re-validation with updated guest OS & hypervisor
- Less granular attestation

Intel® Tiber™ Trust Services

formerly Intel® Trust Authority

Put Zero Trust Within Reach and Get Public Cloud Flexibility with Private Cloud Security

Intel® Tiber™ Trust Services is a new portfolio of software and services that brings enhanced security and assurance to Confidential Computing with Zero Trust principles
In its first generation, it offers an independent attestation service that attests to Trusted Execution Environments (TEEs) that are based on (Intel® SGX) and (Intel® TDX)

Implement the tenets of Zero Trust without incurring the cost and complexity of building your own attestation service

Learn More

Product Brief

What That Means Video

Noname Case Study

Thales Case Study

Zscaler Case Study

Intel® Tiber™ Trust Services

formerly Intel® Trust Authority

How It Works

Get Started with Intel® Trust Authority

1

- Set up or request from your cloud infrastructure provider a confidential computing environment (TEE) instance based on Intel® SGX for workloads or Intel® TDX for virtual machines (VMs)

2

- Identify and enable workloads to run in these confidential computing environments
- This can be done at an application level with Intel® SGX (facilitated by Gramine or another client library) or at a VM level with Intel® TDX

3

- Subscribe to get an Intel® Trust Authority attestation key
- Insert the key into the client library on the workload (Intel® SGX) or VM (Intel® TDX) so it can communicate directly with the SaaS to verify the TEE

Learn more about Intel® Tiber™ Trust Services

Confidential Computing

Software & Solution Ecosystem for Intel® SGX

Commercially Supported Solutions

Build It Yourself

Commercial Solution Providers

anjuna

cosmian

decentriq

EDGELESS SYSTEMS

CYBERNETICA

Fortanix

Mithril Security

Opaque

enclaive

SCONTAIN

HUB SECURITY

secretarium

Curated, Ready-to-Deploy Containers (through Q1'23)*

PyTorch

redis

scikit learn

Spark

TensorFlow

Developer Tools

GRAMINE

SCONE

Occlum

Mystikos

Teaclave

Open Enclave SDK

intel Intel SGX SDK

Systems Integrators

accenture

KPMG

Capgemini

IBM

Atos

leidos

avanade

Hypervisors (SGX)

KVM 5.13 & later

vmware vSphere 8

* Available on Azure Marketplace

Intel® TDX Availability

Intel® TDX is available on 4th Gen Intel® Xeon® Scalable instances in public preview through three leading cloud providers

Click on the logos below for more information on each cloud provider's offering

Microsoft Azure

Alibaba Cloud

Google Cloud

IBM Cloud
*public preview TBA

Intel® TDX is enabled on the following guest OS vendors

Red Hat

SUSE

Canonical Ubuntu

*Intel® TDX becomes generally available with 5th Gen Intel® Xeon® Scalable processor in 2024

How to Get Started

Intel® Software Guard Extensions (Intel® SGX)

More information Get Started

Cloud Service Providers

Click on logos for more info

Azure CORE OVHcloud phoenixNAP GLOBAL IT SERVICES swisscom IBM Cloud CloudSigma

OEMs

Click on logos for more info

Hewlett Packard Enterprise SUPERMICRO

Training & Documentation

Training Videos Technical Library Solution Brief

Intel® Trust Domain Extensions (Intel® TDX)

More information

Documentation

Trust Domain Security Guidance for Developers

Get Started

Intel® Trust Domain Extension (Intel® TDX) Module Download Beta

Intel® Trust Domain Extension (Intel® TDX) Loader

Competitive Comparison

	Intel® SGX	Intel® TDX	AMD SEV-SNP	AWS Nitro Enclaves	Conf. Comp on Nvidia H100 GPU
Cloud infrastructure provider's hardware/firmware, hypervisor and cloud management stack excluded from trust boundary	●	●	●		●
Available through multiple cloud providers to facilitate multi-sourcing	●	●[1]	●		●
Designed to accommodate legacy applications with low or no porting, re-design or re-packaging		●	●		⊙[2]
Attestation of hardware authenticity & correct TEE launch	●	●	●	●	●
Attestation of integrity of software image loaded in TEE	●	⊙[3]	⊙[3]	●	
Confidential data only accessible by designated application code; VM admin, Guest OS, other apps and cloud stack excluded from access	●				
Deployable on "bare metal" servers without virtualization	●				●
Hardware-based, cryptographic memory integrity option for additional Rowhammer protection	●				
Compatible with Intel® Tiber™ Trust Services	●	●			
Competitive Data Sources as of March 2023			Link, Link	Link, Link, Link	Link

[1] Intel® TDX instances coming online at select cloud providers in 2023; Availability timing will vary
[2] No or low changes for legacy code running on GPU. Portions of the workload that use the CPU would need to incorporate a CPU-based TEE and a means of protecting PCIe communications.
[3] Not an inherent capability of available hardware technology but is feasible as value-added capability delivered by the cloud or attestation service provider.

Why Choose Intel for Confidential Computing?

Why Choose Intel for Confidential Computing?

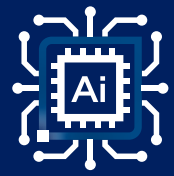
Technology Options to Meet Diverse Security Needs

Only Intel offers both app isolation (Intel® SGX) and VM isolation (Intel® TDX) so customers can precisely tune solution for varying levels of security

Broad Solution Ecosystem

Intel partners with dozens of ISVs and cloud providers to offer hosting services & software solutions, including Confidential AI, analytics, blockchain, databases and more

Access to Experts at Intel and our Solution Partners



Intel experts are ready to assist customers with solution architecture, partner matching, POC resources and deployment troubleshooting

Connect with your Intel Representative for more info

Next Steps

Education

Understand the value of Confidential Computing and how it is necessary for many end user apps to leverage in order to ensure their environment is safe & to enable multi-party computation

Engagement

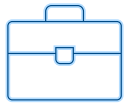
Connect with your Intel Representative to understand more about Intel Confidential Computing Technical Portfolio in the ecosystem

How Intel® Partner Alliance can help

Get Started with Intel® Partner Alliance

Intel Partner Alliance membership gives you exclusive business-building opportunities, like entry to our global marketplace, advanced training, and promotional support – all tailored to your needs

Training and Competencies

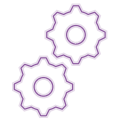


Admission to Intel® Partner University provides you with specialized training on advanced technologies, competency programs and rewards for learning

Marketing Resources

Entry to the Intel® Solutions Marketplace and the Intel® Marketing Studio helps you create more demand for your products and services

Valuable Rewards



Earn points for your qualifying activities, advance your membership status and get access to additional resources to build your business

If you're not already a Member
Join Now

Benefits of a Membership

Earn Points

One of the most popular and differentiated benefits within Intel® Partner Alliance are points we award partners to recognize their business results with Intel and their engagement in high priority activities.

There are over 1,000 ways to earn points within Intel Partner Alliance, and 100's of redemption opportunities.

Cloud Insider Community

Intel® Cloud Insider Community offers continuously refreshed, world-class cloud content and tools. Members have the opportunity to connect with peers and the ecosystem to take innovative, joint cloud solutions to market

Learn More

Industry Insights

Gold and Titanium members can access specifically curated quarterly industry insights to help fuel their growth

Learn More

Financial Incentives

Membership unlocks powerful marketing development funds and incentive programs to accelerate your product marketing success

Speak to your Intel Representative to learn about Intel Partner Alliance Accelerator Initiatives and more Financial Incentives

How to Access Intel® Partner Alliance Customer Support

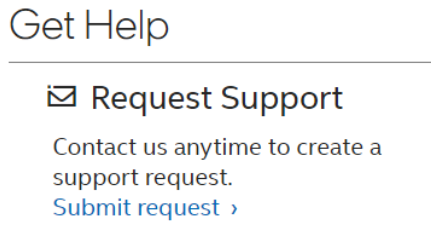
Intel Virtual Assistant

This Chat Bot, located in the bottom-right corner of each Partner Alliance webpage, provides self-help to most questions or a quick link to a live support agent.

Get Help "Blade"

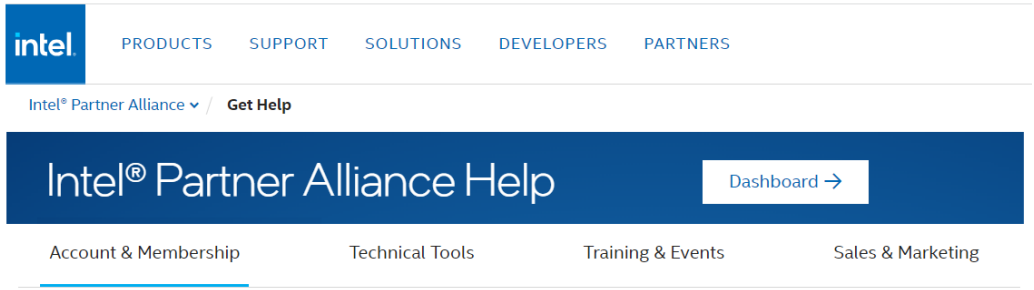
Submit an online support request.

This link is found on the footer of most pages within the Partner Alliance website.



Partner Alliance "Get Help" page

The Get Help page provides detailed self-help guides on most of the tools and benefits available to Partner Alliance members.



Resources

Cloud TV

Intel® Cloud TV explores cloud computing news, trends, and strategies to drive your success

Sapphire Rapids in the Cloud

Learn How to Protect Your Cloud Assets

Security in the Cloud

Security Challenges in the Cloud

Cloud Solutions Architect Certification

Completion of the CSA curriculum equips you with expert-level knowledge of cloud instance details, topics, and solutions

This curriculum is optimized for cloud solution architects with at least two years of experience implementing solutions in the cloud

What You'll Gain

Improve your knowledge and skills related to cloud technologies and solutions architecture to augment the design and implementation of cloud solutions.
Enhance your understanding of the latest industry trends, delivered through interactive courses and lessons designed for online—this makes it simple for learners to advance at their own pace and minimize interruptions to their work and personal time.
Gain advanced knowledge from hands-on labs and deep dives into advanced cloud applications, across a wide variety of cloud workloads, from container orchestration, AI workloads, and instance tuning through the cloud-based CI/CD pipeline.
Obtain industry-recognized certification and credentials based on a hosted/proctored exam.

Start Your Self-Paced Online Certification Training Now

Confidential Computing
Information and Resources

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Confidential Computing 30-3-30

Tech Articles

The State of Confidential Computing

An Introduction to Cloud Security

Videos

Confidential Computing Overview

Security is a challenge

Blogs

A New Paradigm of Performance & Cybersecurity

Security Begins with Intel

Research Paper

Protecting Data and Models within Emerging AI Workflows

Confidential Computing
Resources for DevOps & Cloud Architects

Tech Papers

Accelerated AI Inference with Confidential Computing

Accelerate innovation and enhance data protection with Intel® Security Engines

White Paper

New How to Defeat Cloud Security Threats

New Enabling Sovereign Landing Zones with Confidential Computing

Newsletter

Intel Developer Zone Newsletter

Communities

Intel Community

Security Community Partners

Videos

Intel Security Accelerators Video

Additional Resources

Performance Index

4th Generation Intel® Xeon® Scalable Processors

Live Webinars

Cloud Solution Architect (CSA) Tech Talk: Reduce TCO and Improve Efficiency with 4th Gen Intel® Xeon® Scalable Processors

Recorded Webinars

Cloud Solution Architect (CSA) Tech Talk: Accelerating Critical Workloads with 4th Generation Intel® Xeon® Scalable Processors

Additional Training

Competencies and Certifications

Confidential Computing

Training Links

Security Training Links

Courses / Training

Topic -- Audience
3 Key Technologies to Grow Your Cyber Security Resilience DevOps, Cloud Architects – Confidential Computing
End to End Security for IOT Solutions DevOps
Edge to Cloud Security DevOps, Cloud Architects
Virtual Private Cloud, Cloud Networking and Cloud Security DevOps
Security Value in Intel® Products and Solutions ALL
Securing Applications in the Cloud DevOps
Security in Cloud Computing DevOps, Cloud Architects

Topic - Audience
Virtual Private Cloud, Cloud Networking and Cloud Security DevOps, Cloud Architects
Security in the Business Conversation Cloud Architects, C-Suite
An Encryption Primer for Intel Architecture DevOps
Security Value in Intel® Products and Solutions DevOps, Cloud Architects

Security Training Links

Online Tutorial

Topic -- Audience
How to Enable Intel® Hardware Shield Security Features DevOps – End Point Security


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