



Hybrid Virtualization

CHARON and Oracle

December, 2011



When Virtual Becomes Reality



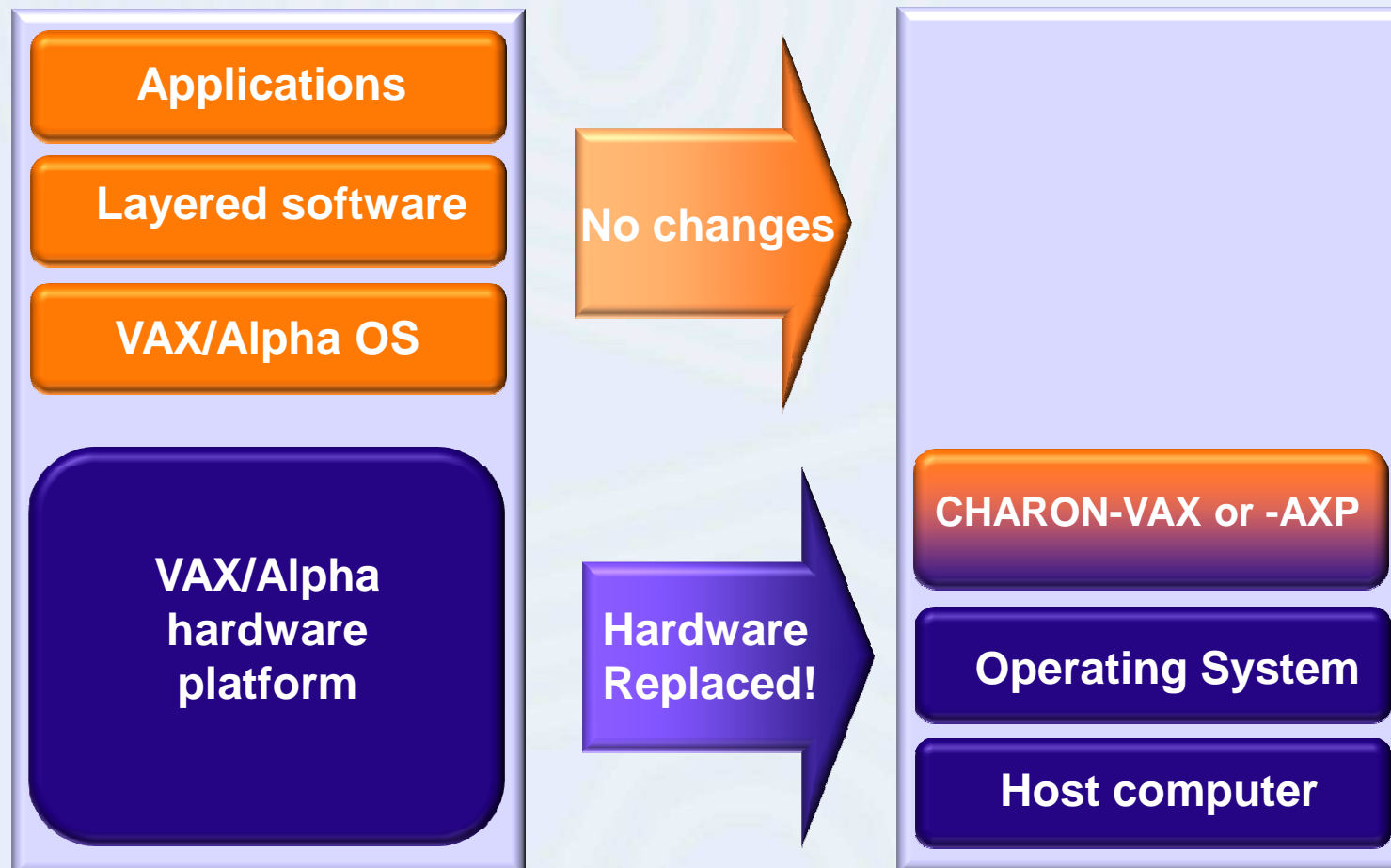
Legacy systems at the cross road

- *(Do nothing)*
- *(Replace application)*
- Binary translation
- Native migration
- Virtualization



HW virtualization, the principle

STROMASYS
VIRTUALIZATION TECHNOLOGIES



When Virtual Becomes Reality

CHARON features

Operating System independent

- Runs VMS, VAXEIn, Tru64 UNIX, Ultrix, NetBSD, etc.

Easy to Migrate (Virtual Hardware Refresh)

- No VAX/Alpha binary code changes
- No VAX/Alpha application source code required
- No special host system or VAX/Alpha Operating System drivers

Keep the benefits of current operating systems

- Supports NI clustering, shared disk clustering, shadowing, striping
- DECnet, Ethernet, TCP/IP, LAT...
- VMS Security

Add the benefits of modern technologies

- Lower cost of ownership ; Higher performance ; Smaller system footprint
- Faster networking ; More and faster storage, SAN, NAS
- Hardware independency (upgradeable/replaceable host)
- Multiple virtual systems on one host, simple consolidation



When Virtual Becomes Reality

Performance challenge

- Rapid advancements in the performance of x86 host systems are pushing the concept of "emulate everything" forward . . .
 - CHARON-VAX is much faster than any VAX CPU that DEC ever designed.
- But, as the implementation scales with the new host system - even the fastest x86 system (3.6 GHz) is only equivalent, in raw performance, to a 750 – 800 MHz hardware Alpha CPU

For High-End systems, the execution speed of a virtual Alpha CPU is limited by the current x86 technology at a level that is lower than the fastest hardware Alpha CPU (1300 MHz)





Therefore the search
to deliver ever more performance
from Hardware Emulation
has lead to options to
Tune and Re-Architect
the new Virtual Host Systems
for better performance





Tuning systems that leverage
Database environments
seemed like ideal
place to Start



CHARON and OracleDB

- Dynamic Instruction Translation (DIT) from CHARON improves floating point and integer calculations. However, DIT does not perform as well with Oracle database, especially Stored Procedures

Therefore, “Off Loading” the Database and creating a Hybrid Solution was proposed as an option that can deliver better performance with a virtualized CHARON solution



CHARON and OracleDB

- Since Oracle uses a traditional client/server software model, Oracle database instances runs as database servers on AlphaServer and on many other platforms
- Oracle clients and applications that run on AlphaServer can connect to Oracle databases running elsewhere on the network (... or on the same system)
- Maybe even more important, the DB client will work with future releases of an Oracle database Server providing new functionality and enhancements



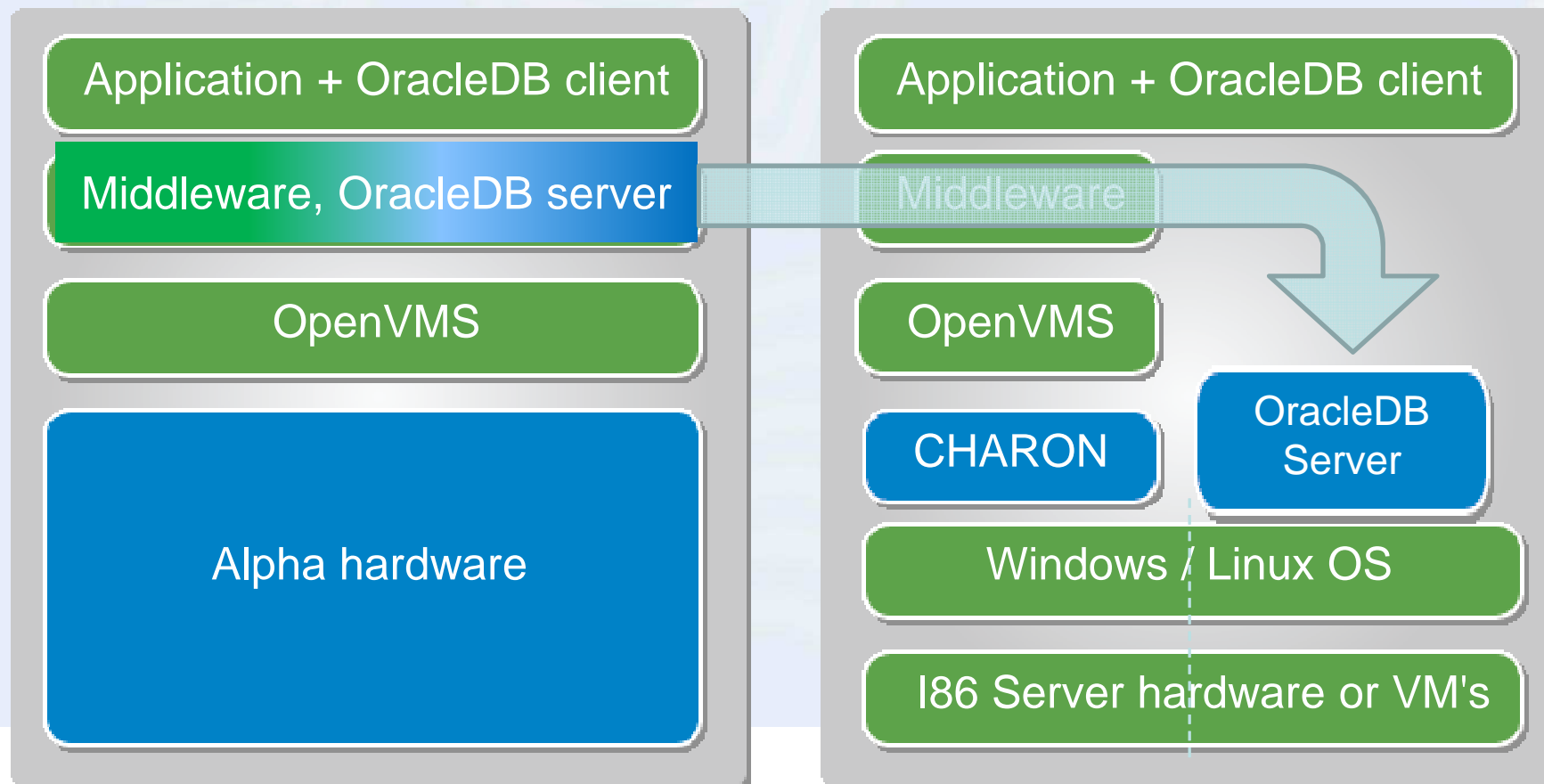
Hybrid Virtualization

- As a result, Stromasys in consultation with Oracle Database on OpenVMS engineering began working to provide the OpenVMS and Tru64 community with a strategy to benefit from this Hybrid approach
- We looked for instances of Oracle for which a compatible version existed on an alternate platform (OS)
- If the legacy DB client can talk to the Oracle Database on the other platform – then the Oracle DB (Server) can be moved off the virtual CHARON environment.
- Due to CHARON's and Oracle's design, changes to original applications are often not required to separate the Oracle DB from the legacy system



CHARON with OracleDB offload

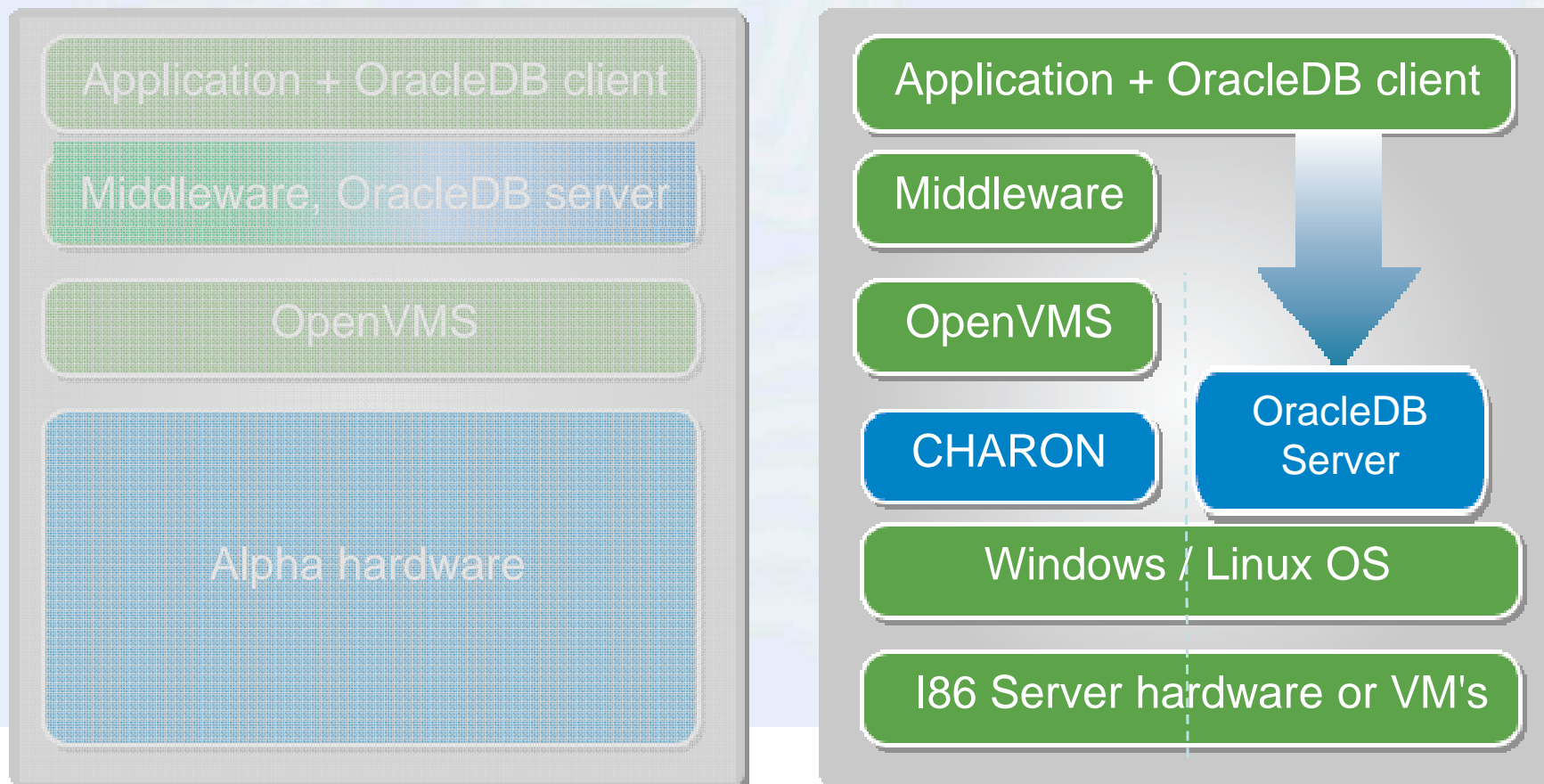
Export OracleDB data from OpenVMS to Windows / Linux





CHARON with OracleDB offload

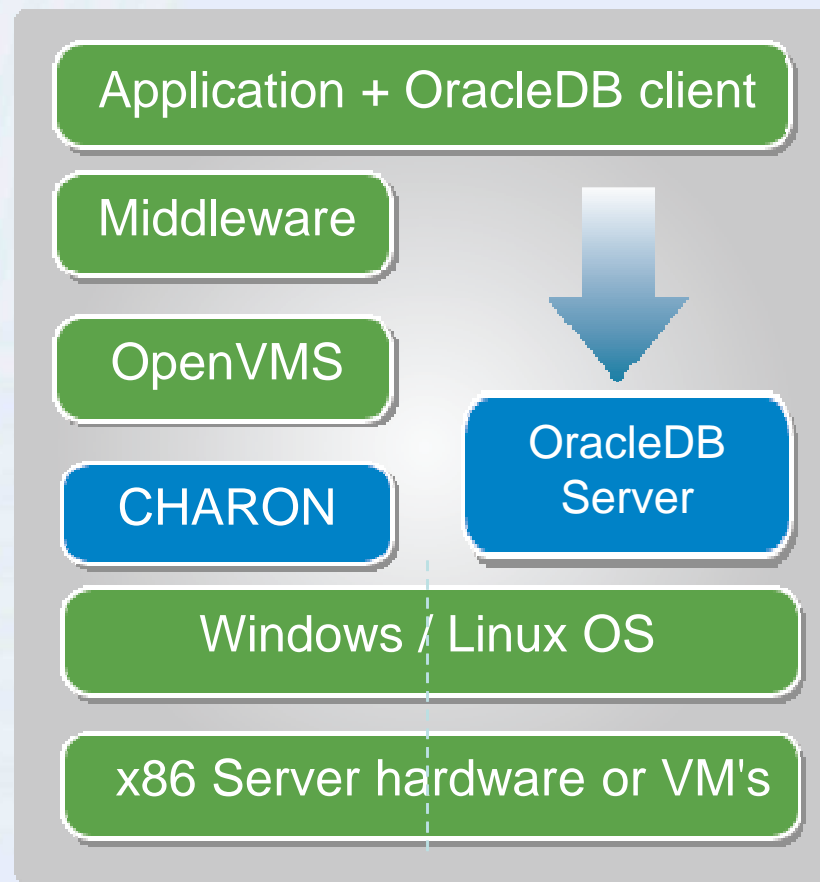
“Point” the OracleDB Client to the Native OracleDB Server





CHARON with OracleDB offload

- The Hybrid approach or “DB Off-Load” approach moves the Oracle database off the AlphaServer
(*Original or Emulated*) and runs natively on another platform
(i.e. Native Linux on x86)



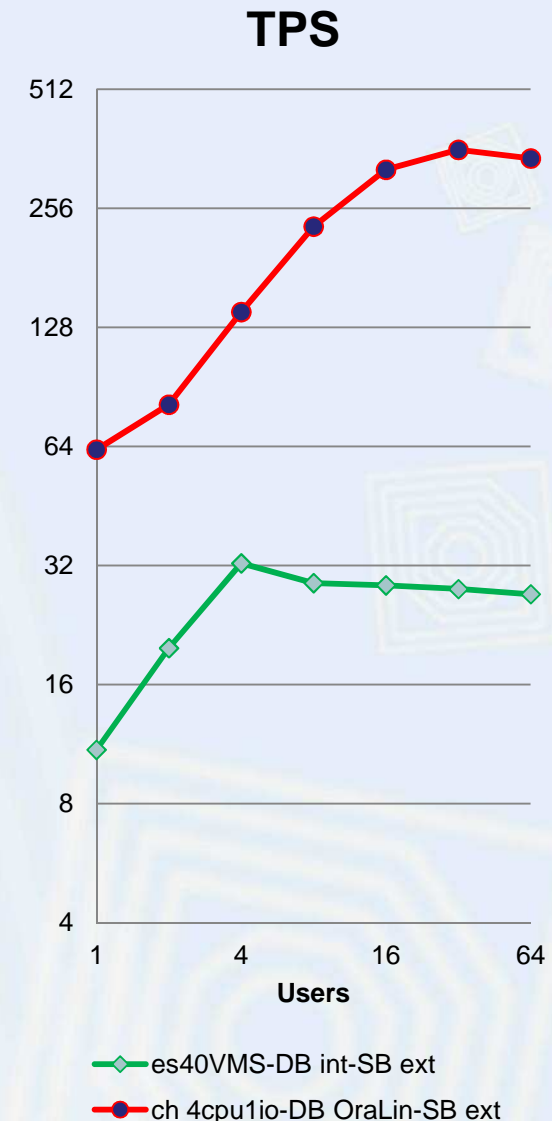
Hybrid Virtualization benefits

- Oracle database compatibility means that an OpenVMS client can work transparently with data that is exported from an OpenVMS OracleDB, say, to a Linux OracleDB,
- Oracle tools provide a simple, automated process export and move the data
- This compatibility that Oracle offers, gives you an immediate performance gains by just moving the database server to a modern platform
- The performance of the standard Oracle (Swingbench) test more than doubles when exported to a modern Linux host compared to running on the original AlphaServer ES40 hardware



Performance boost

- Red line demonstrates Oracle Swingbench results on VMS 8.3 on CHARON-AXP emulating ES40 with 4 CPUs (Intel X5660 server)
- Oracle database and CHARON were installed and ran in parallel on Linux Fedora 14
- Green line demonstrates same test results on a physical AlphaServer ES40 with 4 EV67 667MHz CPUs. Oracle database and Swingbench client are installed in the same VMS 8.3 environment.



Another Reason . . .

- The decision by Oracle to stop development of its Oracle Classic database products on Itanium systems is a situation that requires careful evaluation for the OpenVMS and Tru64 community.
- Unless some change is made, (ex: Hybrid Virtualization) legacy systems / applications can no longer benefit from future OracleDB developments
- However, separating the database server from the legacy systems provides a “Win-Win” scenario for this problem



Oracle Rdb and CHARON

Where does this leave Rdb, for which no x86 or SPARC server product exists?

- The principle of splitting the Client and Server over two virtual systems still applies and will lessen the system load
- In addition, Stromasys is working in collaboration with Oracle Rdb Engineering to investigate specific CHARON-AXP implementation (CHARON-AXP/Rdb) that is optimized for OracleRdb server operation.
 - We are investigating Alpha memory mapping, virtual CPU options that is optimized for the processing of database pointers, faster I/O path (with integrated iSCSI), etc.



CHARON with OracleDB offload

- Things to Consider...
 - Need to have some Oracle expertise (Oracle can help!)
 - Export/import of Oracle database will take time and additional disk space
 - Need to reconfigure the Oracle TNS names to reflect the changes



Hybrid virtualization benefits

- The OpenVMS client can work transparently with the data that is moved from an OpenVMS OracleDB to a Linux OracleDB
 - Simple, automated process
 - Oracle tools available
- Oracle compatibility allows an immediate performance increase by placing the same data on a modern platform
- The (virtual) system hosting the application is off-loaded, resulting in higher available CPU power for the remaining parts of the application
- The client will work with future releases of the Oracle database Server



Bottom line and Next Steps...

- **Hybrid Virtualization** is a viable solution
- **The “Next Step” in Cross-Platform Virtualization** will allow for the transparent division of the logical parts of the overall system and allow them to run (virtually) where they will perform the best.
- As in the OracleDB example, solutions / options include:
 - Single new host server (if powerful enough)
 - Multiple physical hosts, i.e. separate host for the OracleDB Server in order to optimize licensing cost and performance
 - Don’t forget that, licensing costs of Databases (or middleware, etc.) are often based on the total number of cores – so separating the DB and allowing it to run on its own separate server could also help reduce licensing costs.





CHARON is Windows, Linux, and VMware – *READY!*

PRESERVING YOUR SOFTWARE INVESTMENT
ACROSS HARDWARE GENERATIONS



When Virtual Becomes Reality



Thank You / Feedback



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