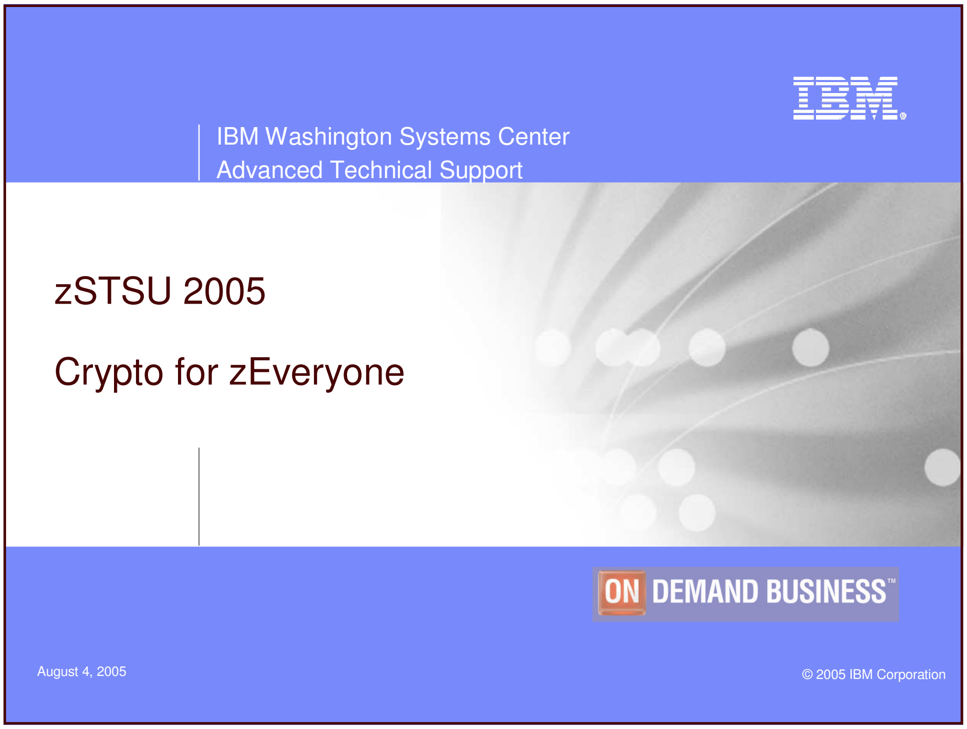


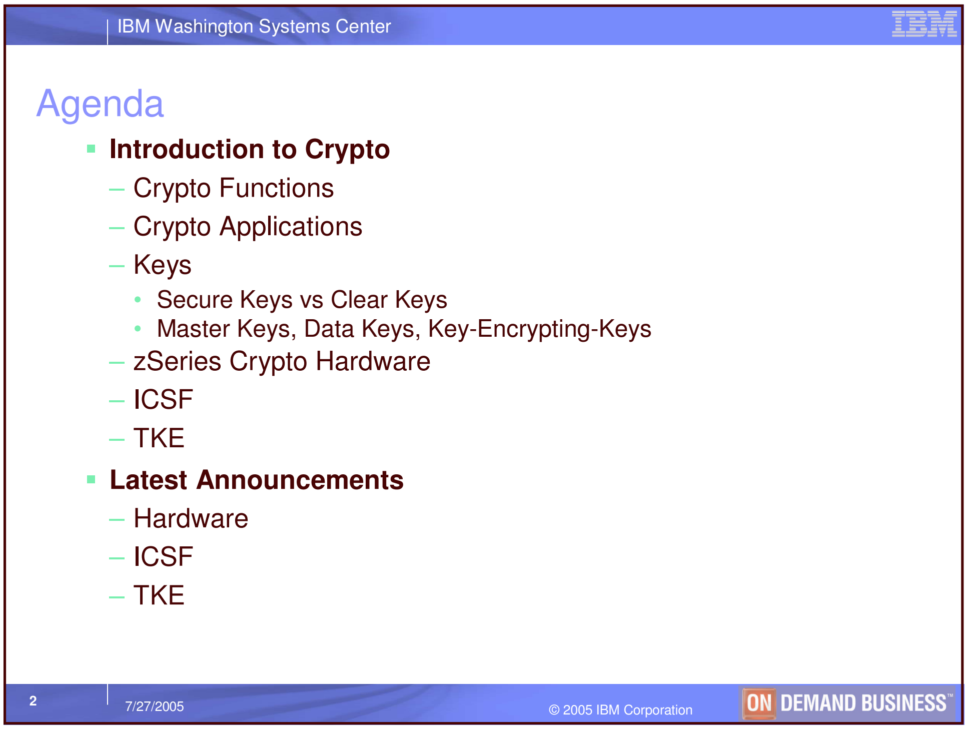
IBM Washington Systems Center
Advanced Technical Support

zSTSU 2005

Crypto for zEveryone

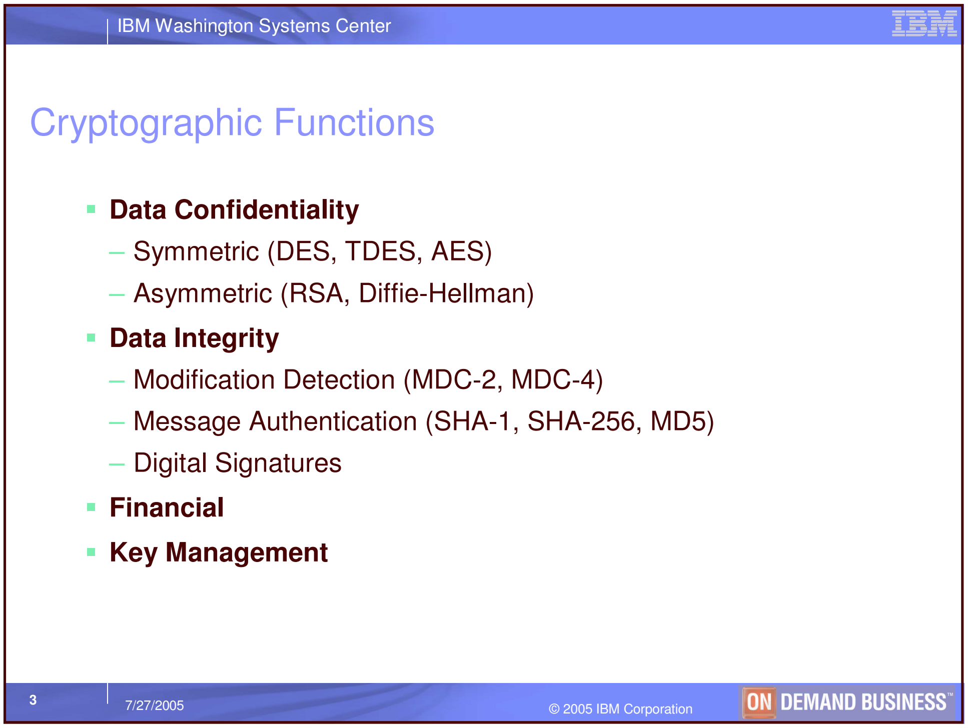
ON DEMAND BUSINESS™

August 4, 2005



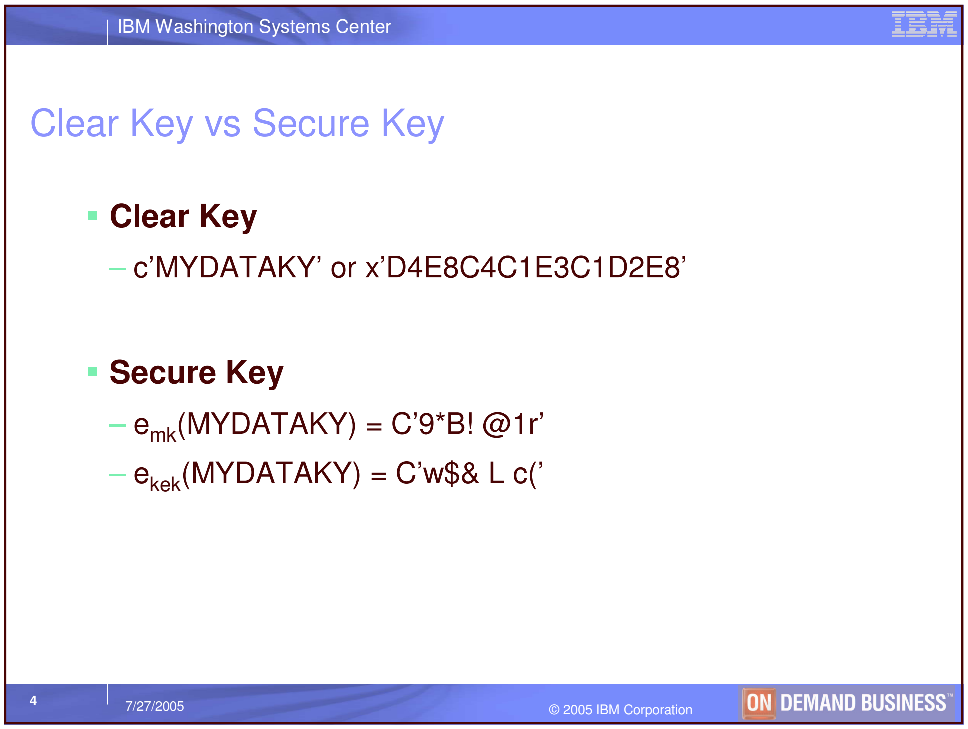
Agenda

- **Introduction to Crypto**
  - Crypto Functions
  - Crypto Applications
  - Keys
    - Secure Keys vs Clear Keys
    - Master Keys, Data Keys, Key-Encrypting-Keys
  - zSeries Crypto Hardware
  - ICSF
  - TKE
- **Latest Announcements**
  - Hardware
  - ICSF
  - TKE



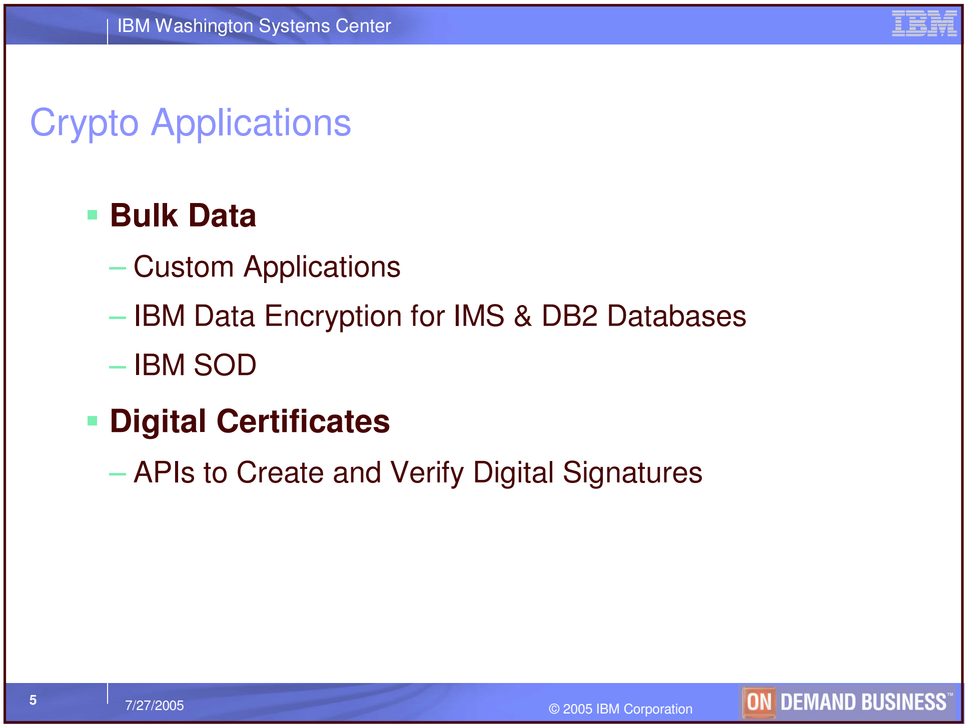
Cryptographic Functions

- **Data Confidentiality**
  - Symmetric (DES, TDES, AES)
  - Asymmetric (RSA, Diffie-Hellman)
- **Data Integrity**
  - Modification Detection (MDC-2, MDC-4)
  - Message Authentication (SHA-1, SHA-256, MD5)
  - Digital Signatures
- **Financial**
- **Key Management**



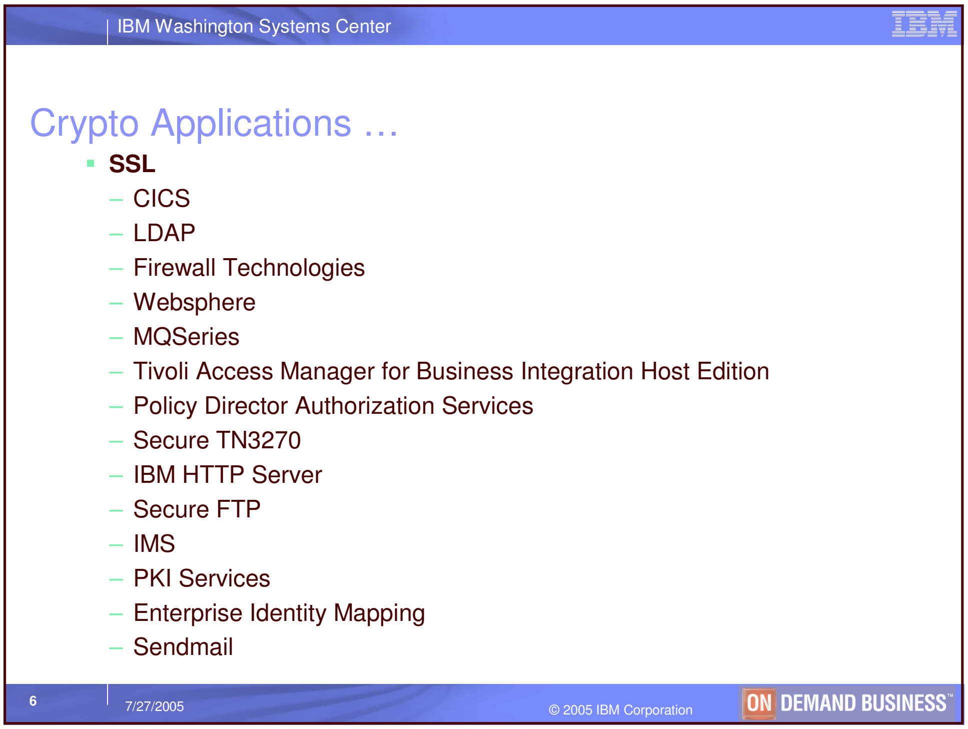
Clear Key vs Secure Key

- **Clear Key**
  - c'MYDATAKY' or x'D4E8C4C1E3C1D2E8'
- **Secure Key**
  - e_{mk}(MYDATAKY) = C'9*B! @1r'
  - e_{kek}(MYDATAKY) = C'w$& L c('



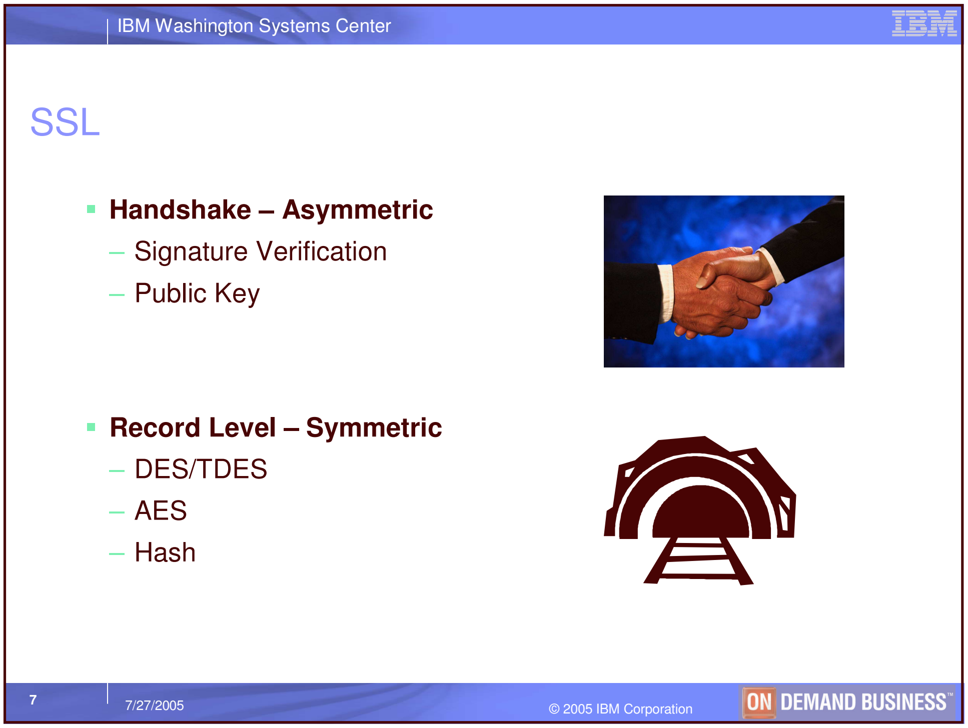
Crypto Applications

- **Bulk Data**
  - Custom Applications
  - IBM Data Encryption for IMS & DB2 Databases
  - IBM SOD
- **Digital Certificates**
  - APIs to Create and Verify Digital Signatures



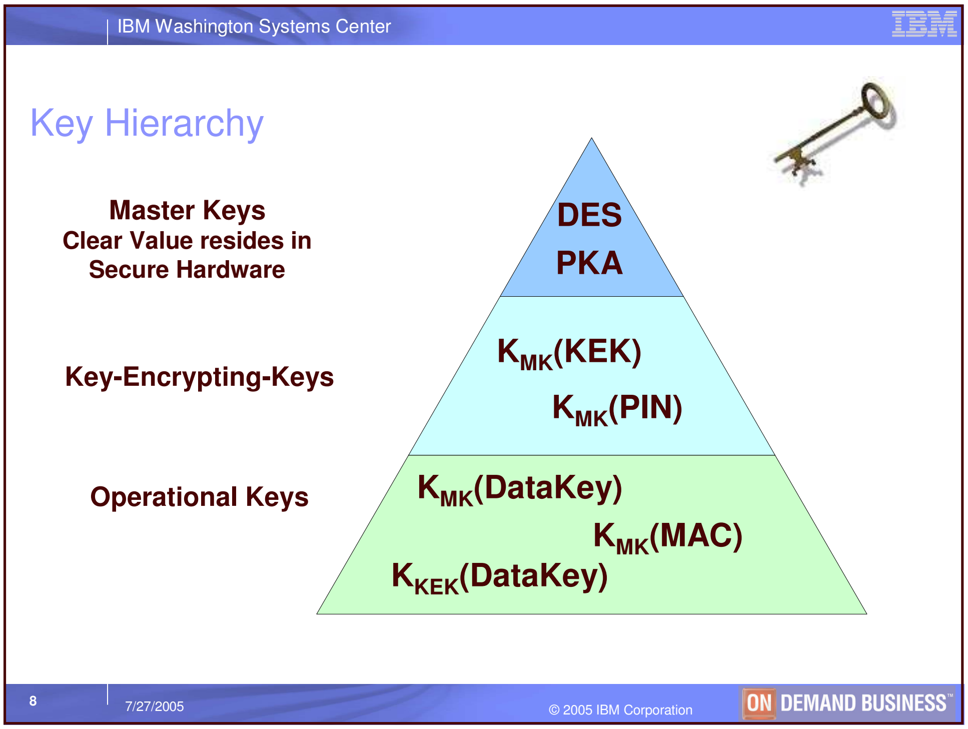
Crypto Applications …

- **SSL**
  - CICS
  - LDAP
  - Firewall Technologies
  - Websphere
  - MQSeries
  - Tivoli Access Manager for Business Integration Host Edition
  - Policy Director Authorization Services
  - Secure TN3270
  - IBM HTTP Server
  - Secure FTP
  - IMS
  - PKI Services
  - Enterprise Identity Mapping
  - Sendmail



SSL

- **Handshake – Asymmetric**
  - Signature Verification
  - Public Key
- **Record Level – Symmetric**
  - DES/TDES
  - AES
  - Hash



Key Hierarchy

Master Keys
Clear Value resides in
Secure Hardware

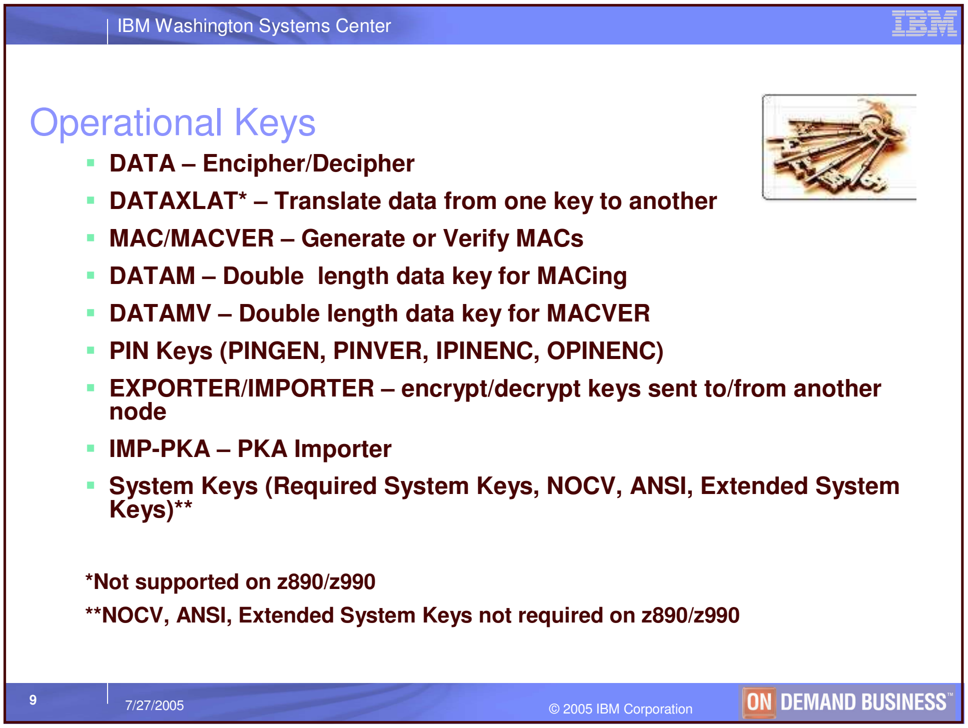
Key-Encrypting-Keys

Operational Keys

DES
PKA

K_{MK}(KEK)
K_{MK}(PIN)

K_{MK}(DataKey)
K_{MK}(MAC)
K_{KEK}(DataKey)

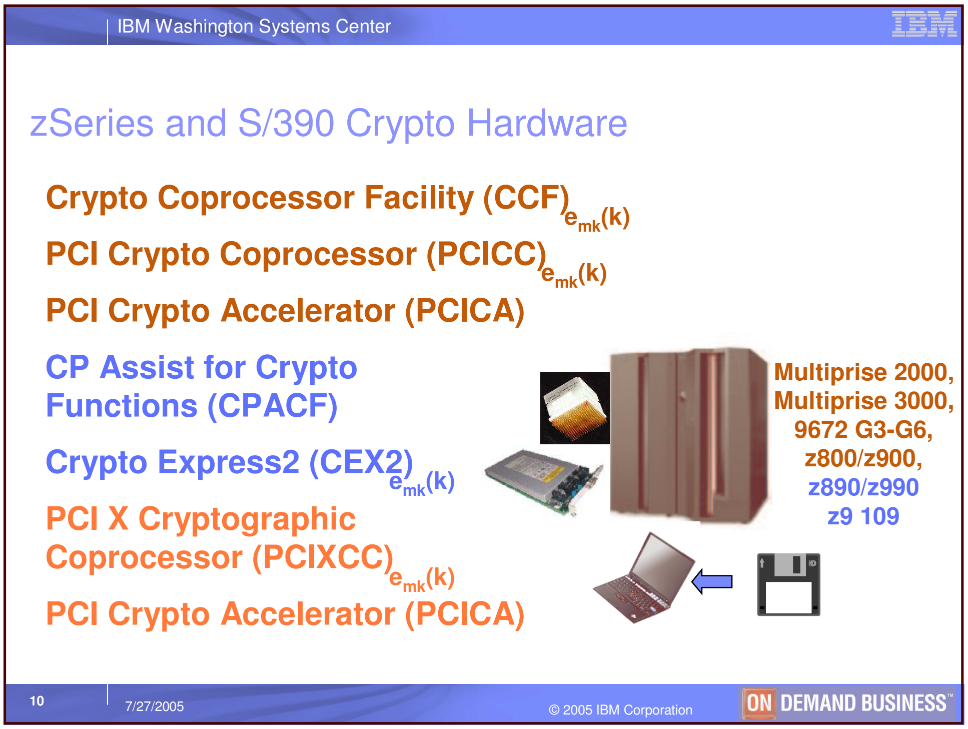


Operational Keys

- DATA – Encipher/Decipher
- DATAXLAT* – Translate data from one key to another
- MAC/MACVER – Generate or Verify MACs
- DATAM – Double length data key for MACing
- DATAMV – Double length data key for MACVER
- PIN Keys (PINGEN, PINVER, IPINENC, OPINENC)
- EXPORTER/IMPORTER – encrypt/decrypt keys sent to/from another node
- IMP-PKA – PKA Importer
- System Keys (Required System Keys, NOCV, ANSI, Extended System Keys)**

*Not supported on z890/z990

**NOCV, ANSI, Extended System Keys not required on z890/z990



zSeries and S/390 Crypto Hardware

Crypto Coprocessor Facility (CCF)$e_{mk}(k)$

PCI Crypto Coprocessor (PCICC)$e_{mk}(k)$

PCI Crypto Accelerator (PCICA)

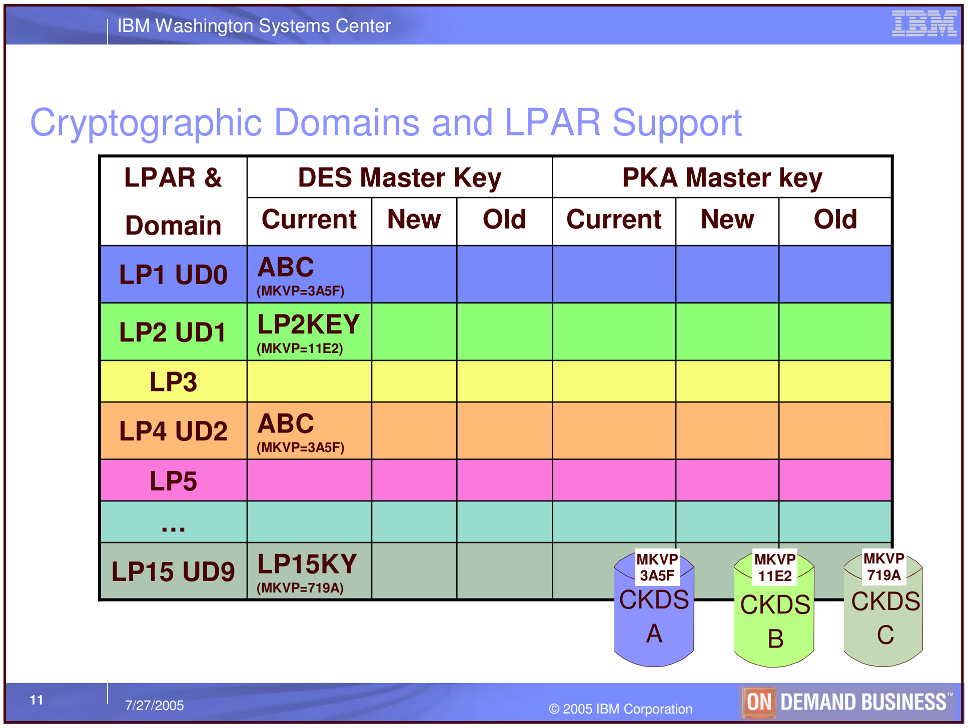
CP Assist for Crypto Functions (CPACF)

Crypto Express2 (CEX2)$e_{mk}(k)$

PCI X Cryptographic Coprocessor (PCIXCC)$e_{mk}(k)$

PCI Crypto Accelerator (PCICA)

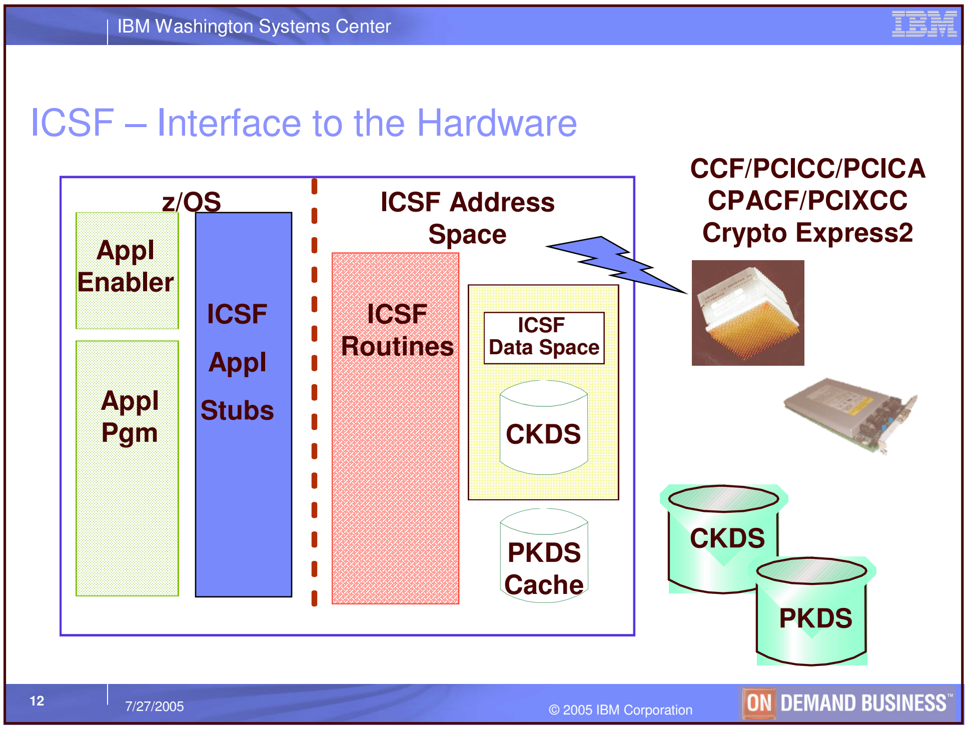
Multiprise 2000,
Multiprise 3000,
9672 G3-G6,
z800/z900,
z890/z990
z9 109



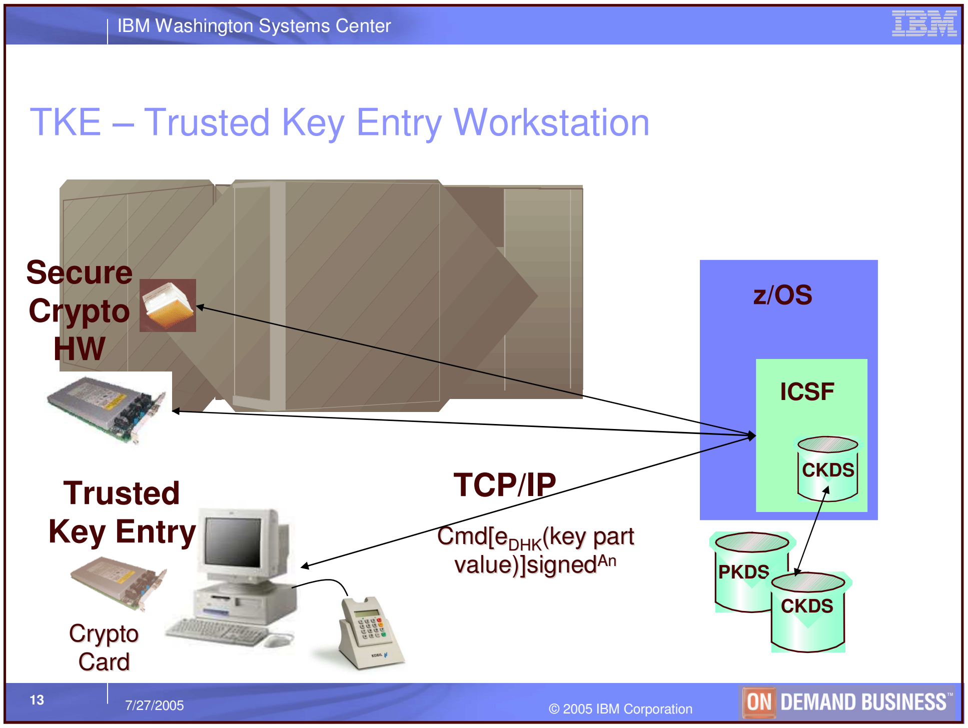
Cryptographic Domains and LPAR Support

LPAR &	DES Master Key			PKA Master key		
Domain	Current	New	Old	Current	New	Old
LP1 UD0	ABC (MKVP=3A5F)					
LP2 UD1	LP2KEY (MKVP=11E2)					
LP3						
LP4 UD2	ABC (MKVP=3A5F)					
LP5						
…						
LP15 UD9	LP15KY (MKVP=719A)					

MKVP 3A5F
CKDS A
MKVP 11E2
CKDS B
MKVP 719A
CKDS C



ICSF – Interface to the Hardware



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TKE – Trusted Key Entry Workstation

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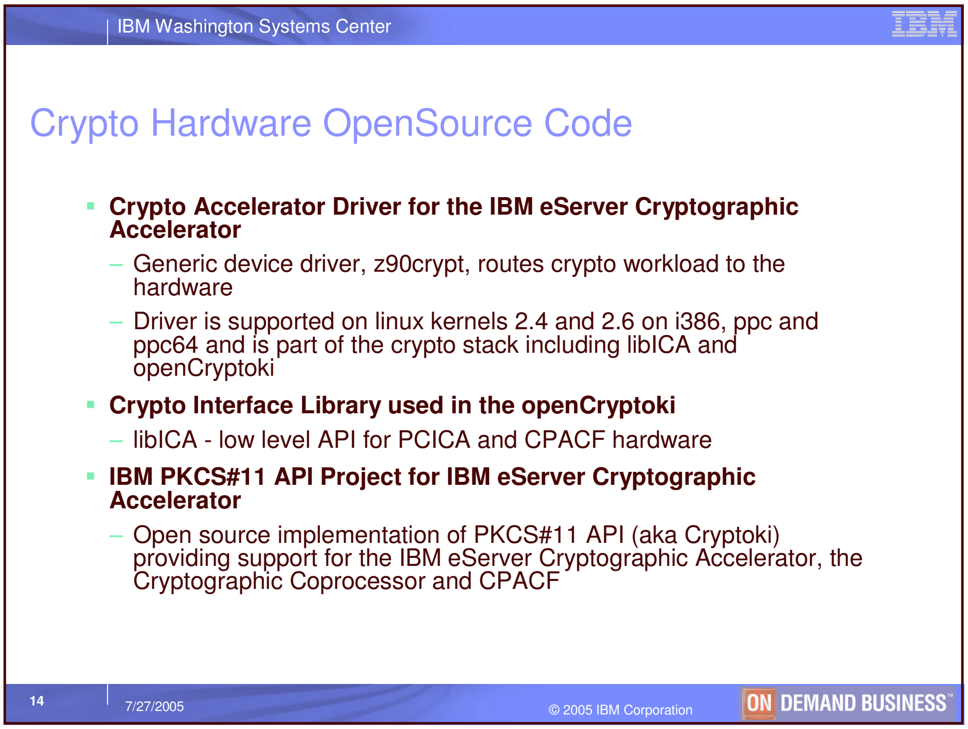

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Crypto Hardware OpenSource Code

- **Crypto Accelerator Driver for the IBM eServer Cryptographic Accelerator**
  - Generic device driver, z90crypt, routes crypto workload to the hardware
  - Driver is supported on linux kernels 2.4 and 2.6 on i386, ppc and ppc64 and is part of the crypto stack including libICA and openCryptoki
- **Crypto Interface Library used in the openCryptoki**
  - libICA - low level API for PCICA and CPACF hardware
- **IBM PKCS#11 API Project for IBM eServer Cryptographic Accelerator**
  - Open source implementation of PKCS#11 API (aka Cryptoki) providing support for the IBM eServer Cryptographic Accelerator, the Cryptographic Coprocessor and CPACF

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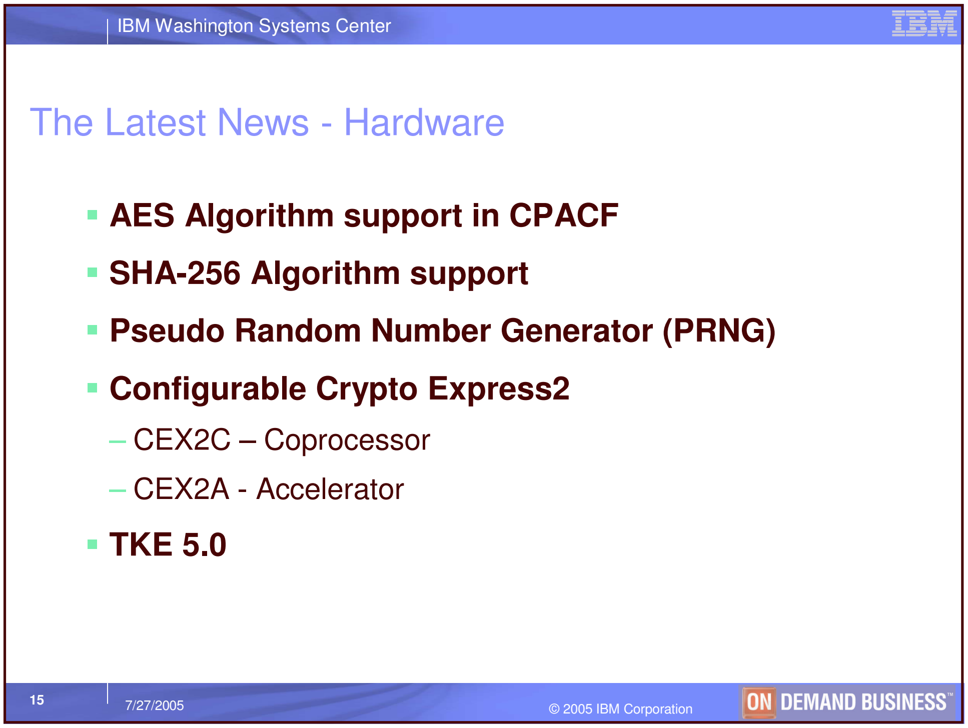
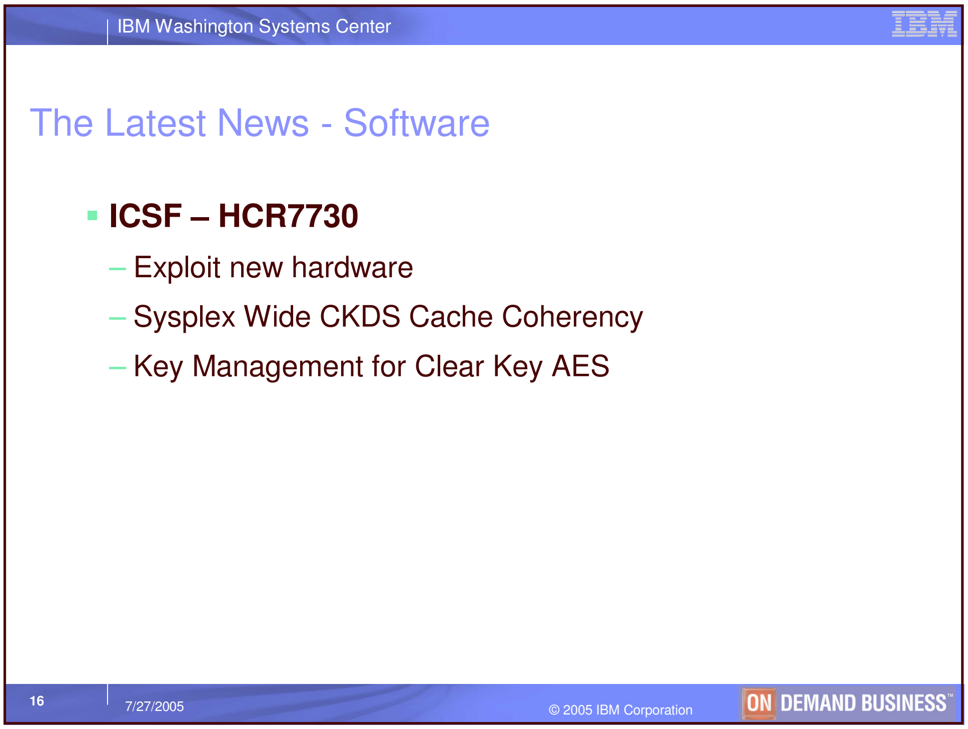


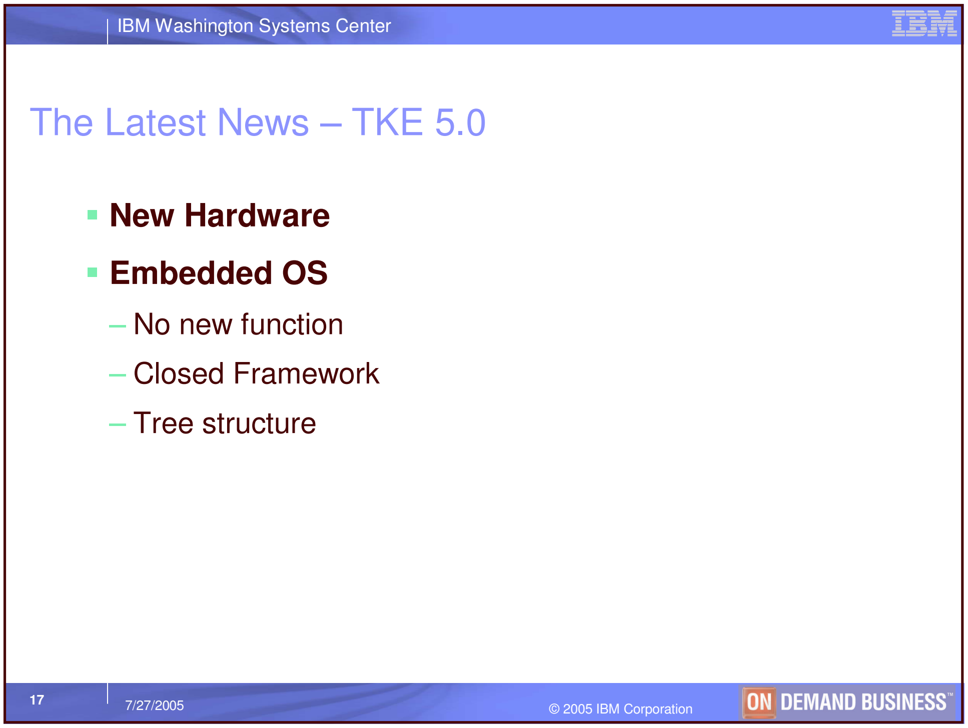
The Latest News - Hardware

- **AES Algorithm support in CPACF**
- **SHA-256 Algorithm support**
- **Pseudo Random Number Generator (PRNG)**
- **Configurable Crypto Express2**
  - CEX2C – Coprocessor
  - CEX2A - Accelerator
- **TKE 5.0**



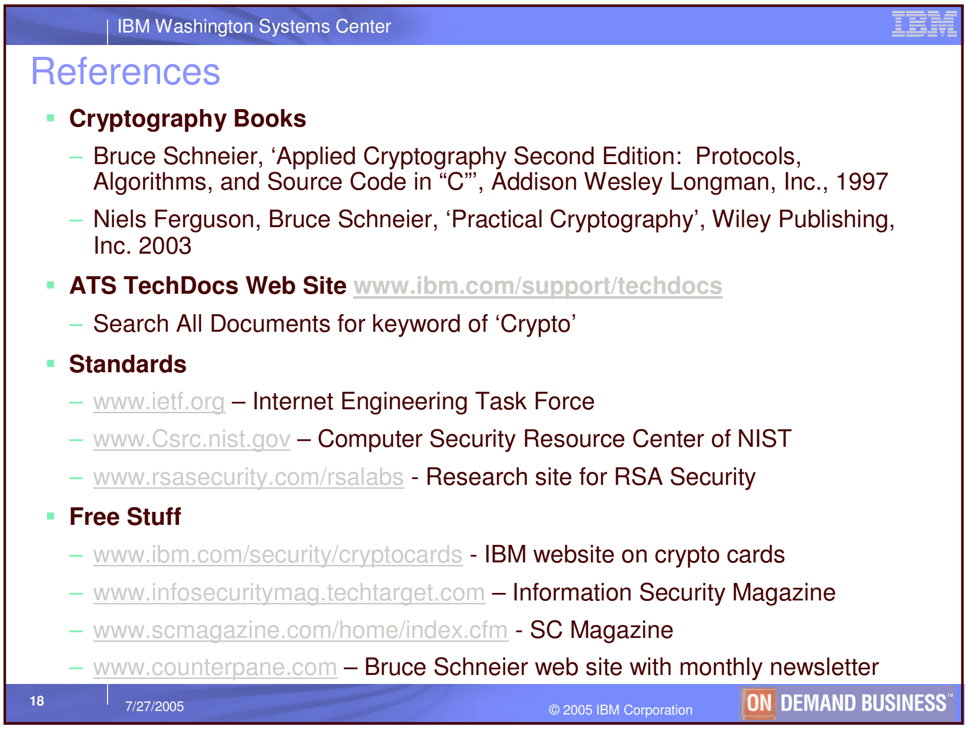
The Latest News - Software

- **ICSF – HCR7730**
  - Exploit new hardware
  - Sysplex Wide CKDS Cache Coherency
  - Key Management for Clear Key AES



The Latest News – TKE 5.0

- **New Hardware**
- **Embedded OS**
  - No new function
  - Closed Framework
  - Tree structure



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  - Niels Ferguson, Bruce Schneier, ‘Practical Cryptography’, Wiley Publishing, Inc. 2003
- **ATS TechDocs Web Site** www.ibm.com/support/techdocs
  - Search All Documents for keyword of ‘Crypto’
- **Standards**
  - www.ietf.org – Internet Engineering Task Force
  - www.Csrc.nist.gov – Computer Security Resource Center of NIST
  - www.rsasecurity.com/rsalabs - Research site for RSA Security
- **Free Stuff**
  - www.ibm.com/security/cryptocards - IBM website on crypto cards
  - www.infosecuritymag.techtarget.com – Information Security Magazine
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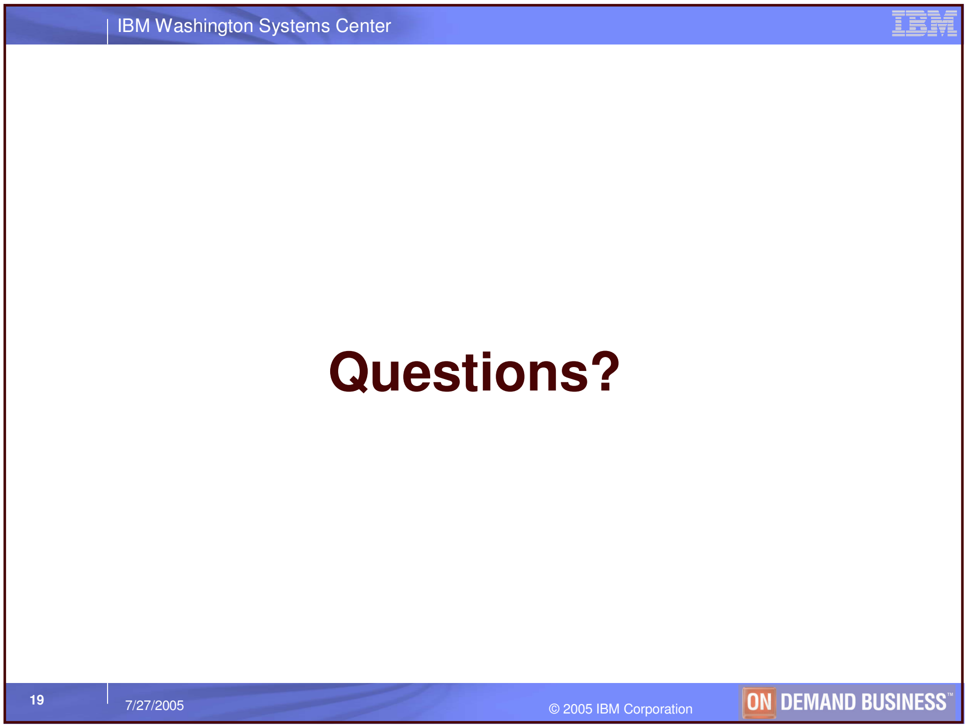
  - www.counterpane.com – Bruce Schneier web site with monthly newsletter



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