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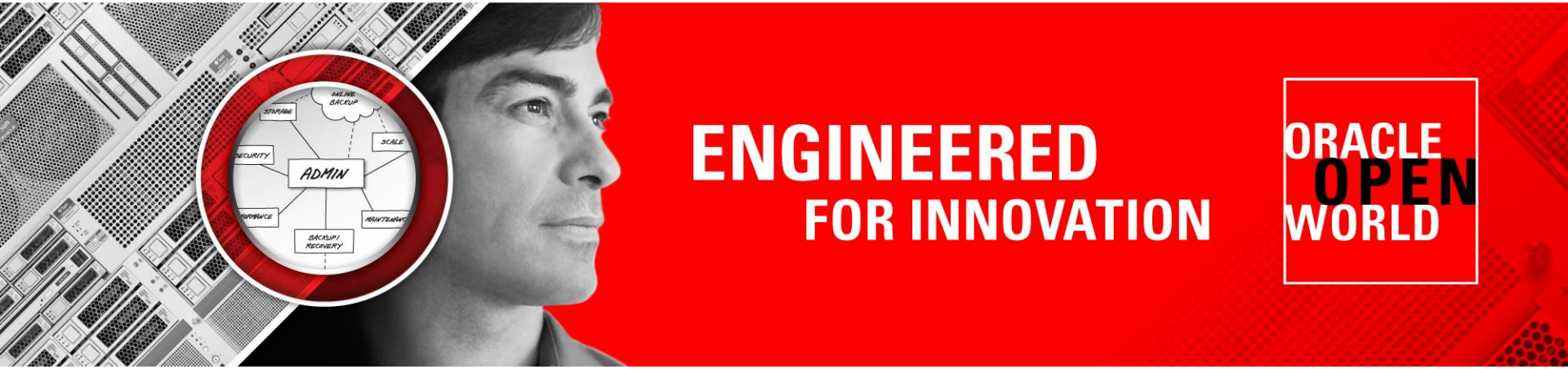


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# Real Life Stories on Extreme Performance with In-Memory Database Technology

Presented at Oracle Open World

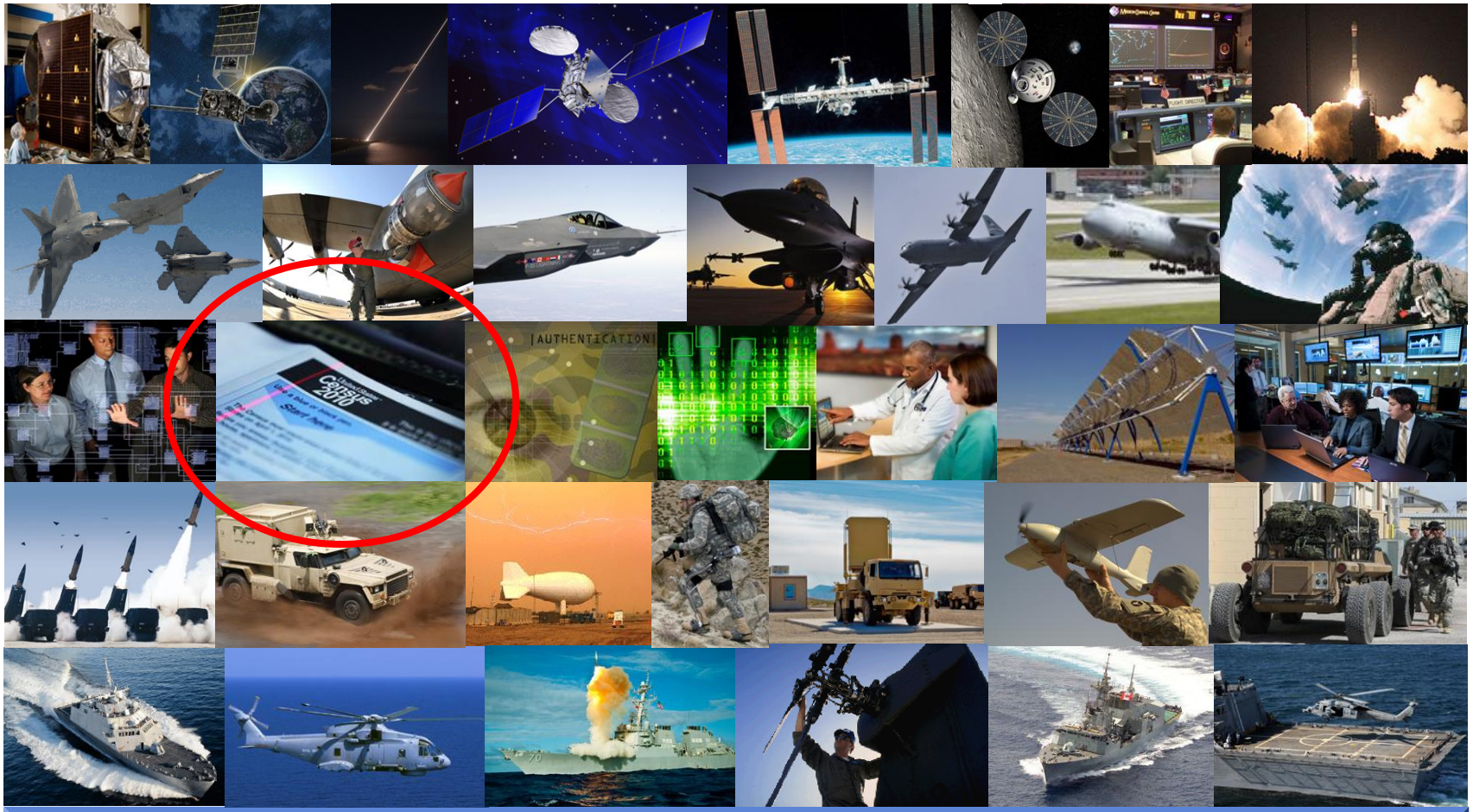
# *The Lockheed Martin Census Practice*

## TimesTen Use in UK Census

ORACLE
OpenWorld 2011

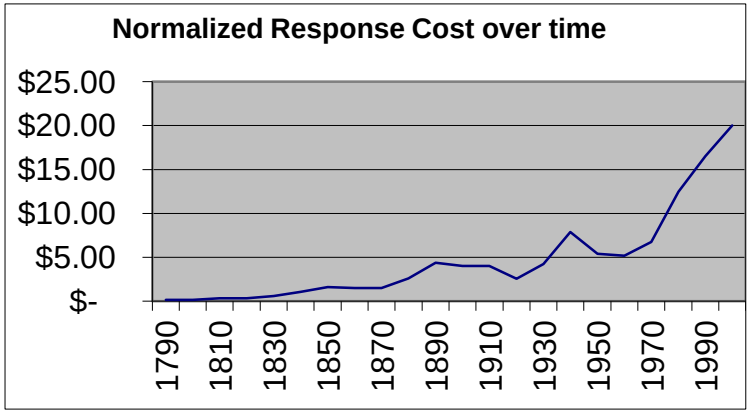
*John White*
*Chief Architect – UK Census*
*IS&GS-Civil, Greenbelt, MD*
*John.White@lmco.com*

# *Lockheed Martin – We Are the How*



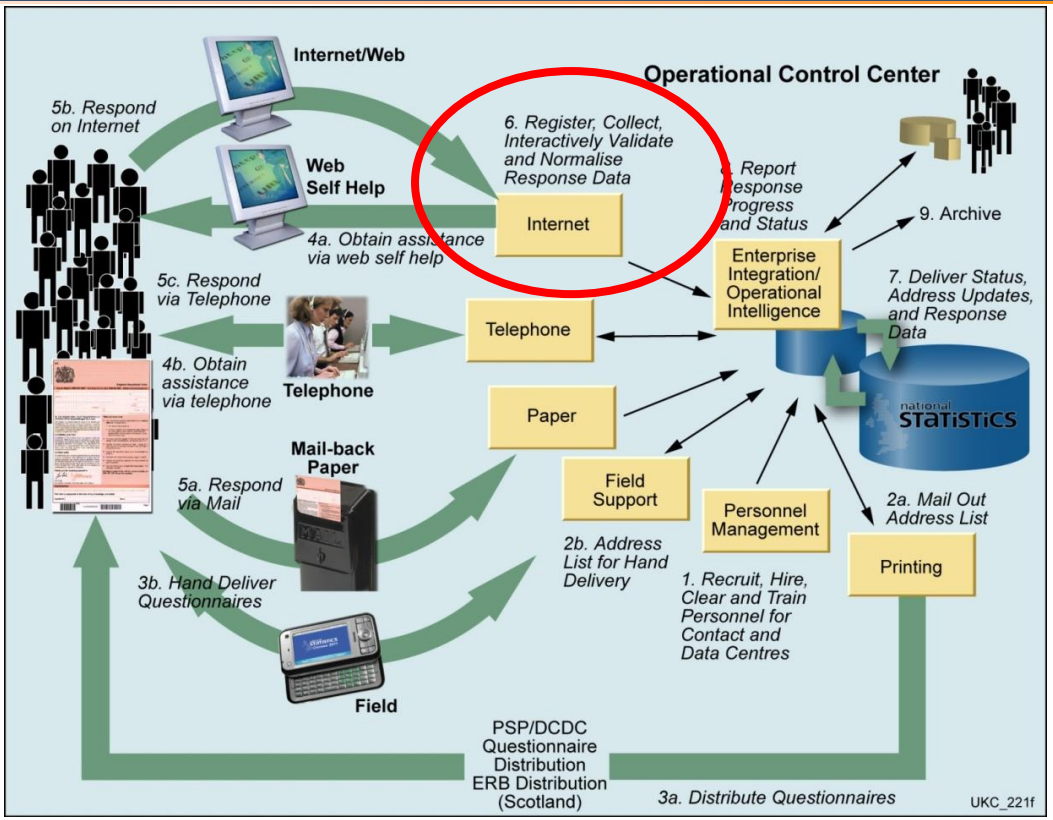

***Between the Idea and the Achievement, There Is One Important Word:***
**HOW … And It Is the HOW that Makes All the Difference**

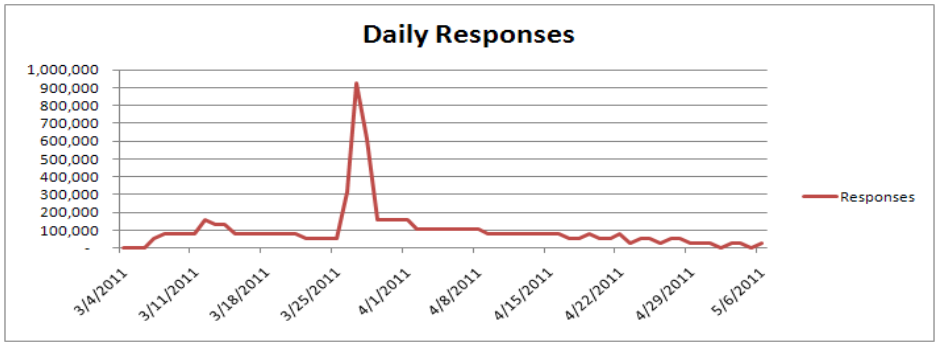
# Use Case: UK 2011 Census

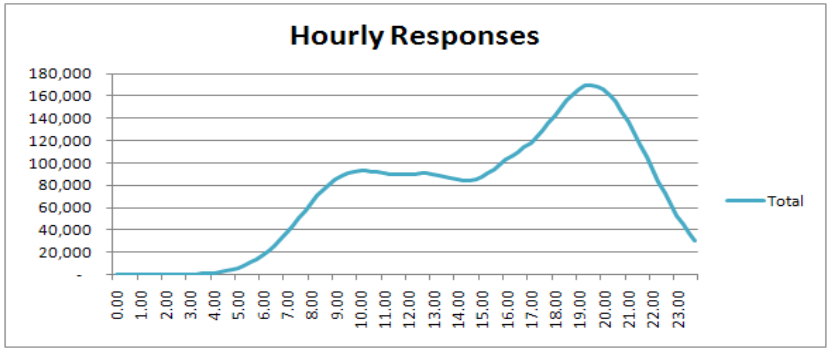



## Cost by Response Channel

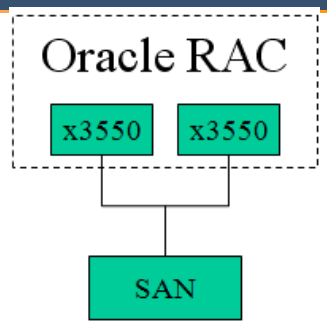
- *Field - ~$90*
- *Telephone - ~$10*
- *Paper - ~$4*
- *Internet - ~$1*



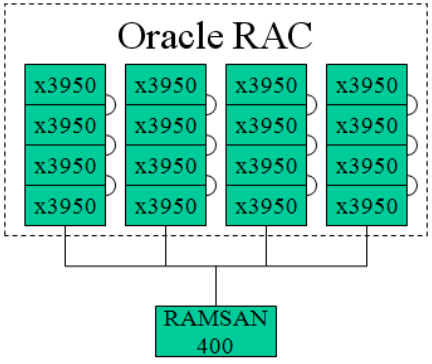
# Challenge: Central DB Load




- **Requirement: Must store data after each page**
- **Initial IDB Load Estimate: 465 TPS**

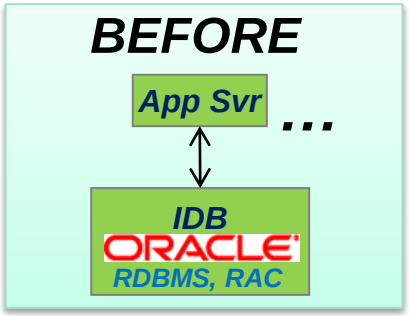
| Change | Increased load on IDB |
|---|---|
| Load Balancer design solution | 2X |
| WSH integration/login redirection solution | 2X |
| 24->32 page questionnaires | 1.6X |
| Questionnaire App Database Interaction | 8X |
| Increased Internet Uptake | 5X |
| **Total** | **2 * 2 * 1.6 * 8 * 5 = 256X** |

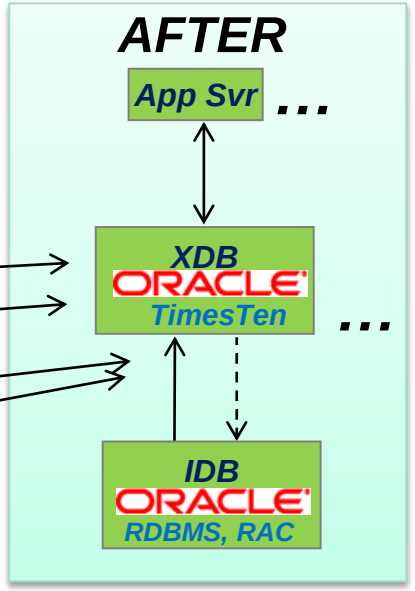
- **Final IDB Load Estimate: *119,026 TPS***



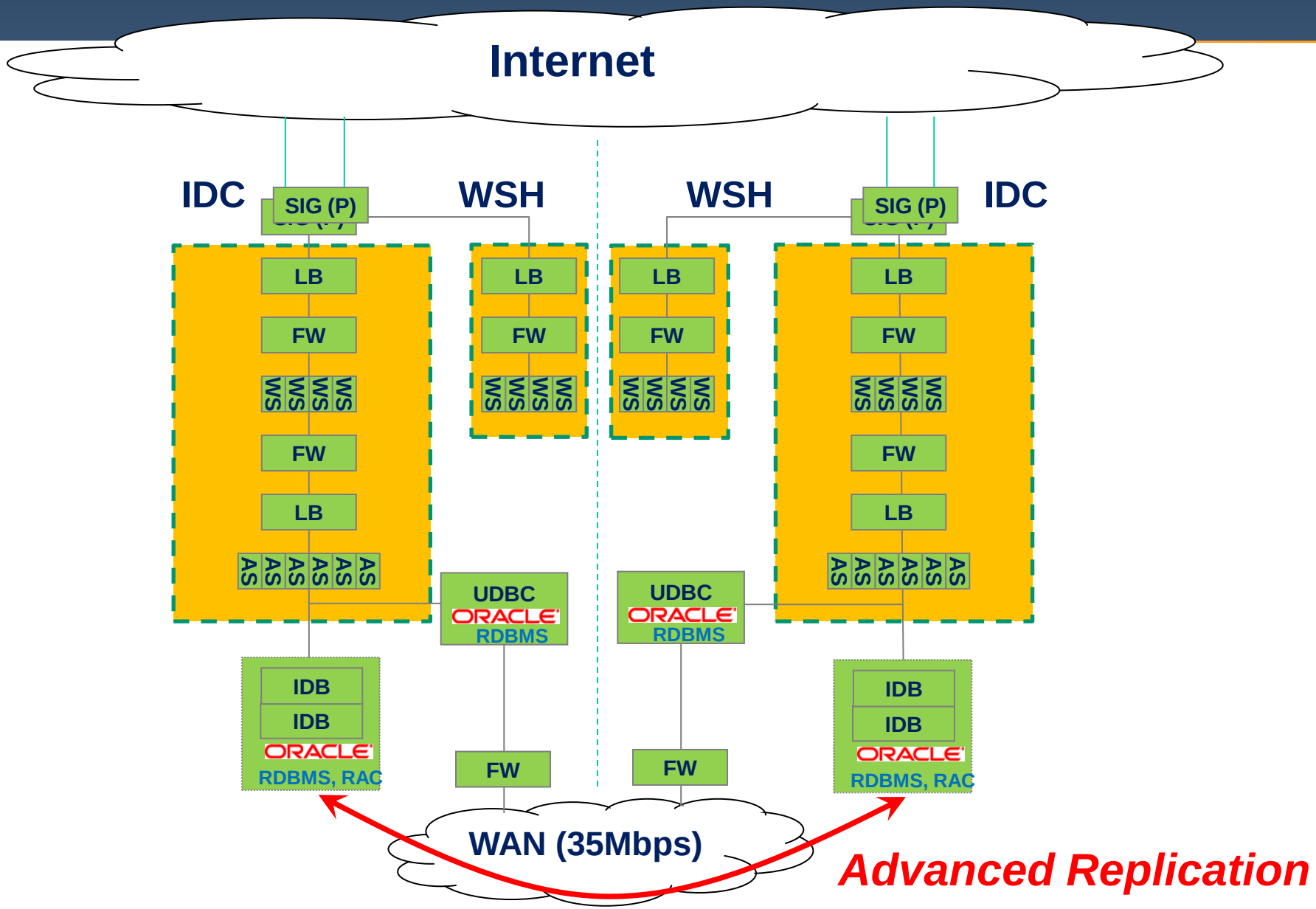
# Use of Times 10

- **Rearchitected solution to reduce load on IDB**
- **Used TimesTen as local data cache in cluster**
  - ***Served local transactions***
  - ***Read from IDB during login***
  - ***Aged to IDB after local transaction***
- **Enabled move from risky Active/Active to Active/Passive IDB**
- **Concerns**
  - ***Deployment Location***
  - ***Sizing***
  - ***Aging latency***
  - ***Network load***

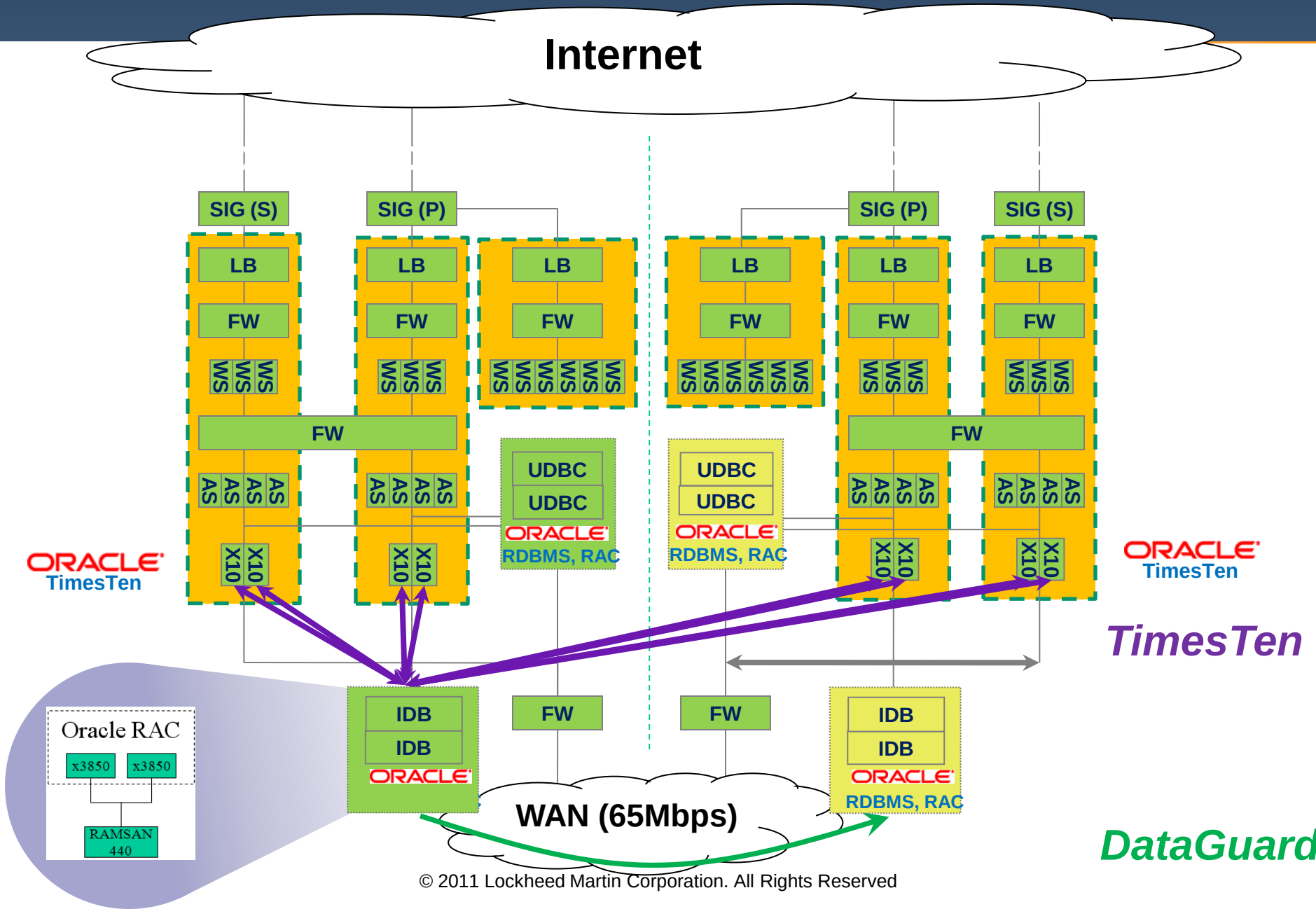


# Before



# After



# Results

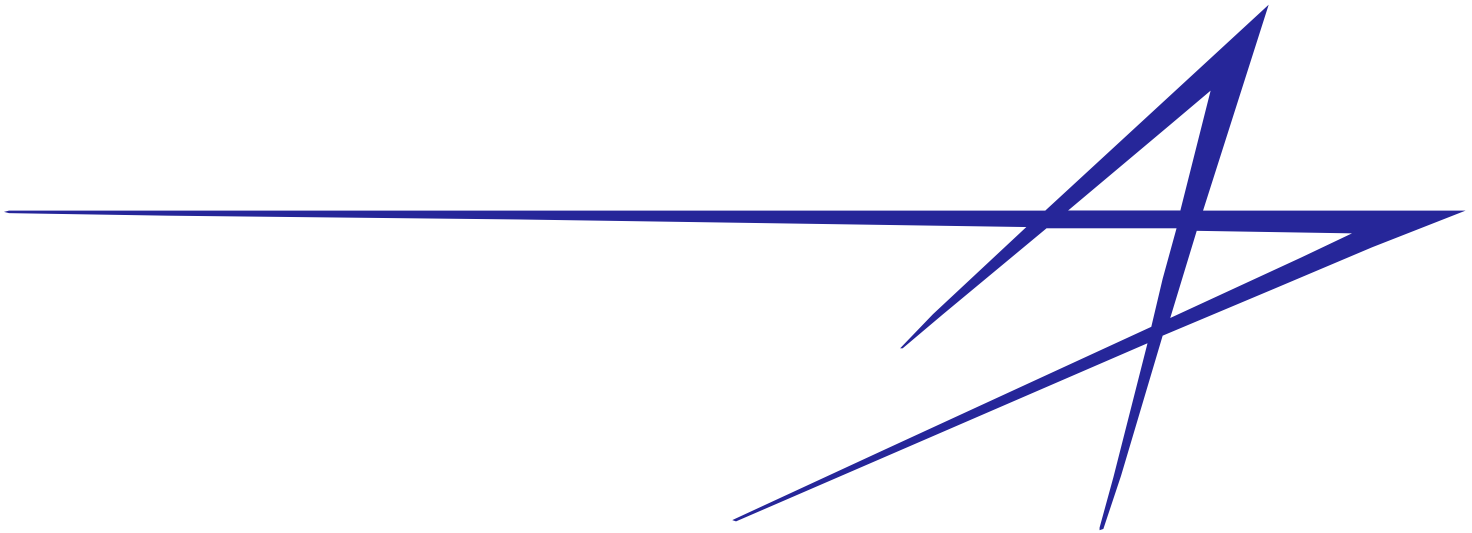
- **Verified with cloud based full scale load testing:**
  - ***3.0 million daily responses***
  - ***200,000 peak concurrent users***
  - ***1 second average page response time***
  - ***IDB: 6,118 TPS***
  - ***Availability maintained through simulated site, cluster and component failure***

- **Actual production usage:**
  - ***3.7 million total responses***
  - ***36,000 peak concurrent users***
  - ***<1 second average page response time***
  - ***IDB: 1,101 TPS***
  - ***Production availability: 99.94%***

# *Lessons Learned*

- **Performance better than expected – 10X better**
- **Needed more RAM than expected – 24GB/CPU**
- **Log writing greater than expected**
  - ***Data written to XDB disk then aged to central IDB***
  - ***Disks need to be sized to handle transaction load***
- **TimesTen deployment doesn't have to be coresident with app**
- **Latency somewhat configurable**
  - ***Max Latency = aging frequency + max time to age***
- **Network load not overly burdensome**
  - ***On par with Advanced Replication traffic load - ~10Mbps***
- **Cloud based testing was most cost effective to do full load test**

# Thank You!



***John White***
***Chief Architect – UK Census***
***Lockheed Martin***
***john.white@lmco.com***