

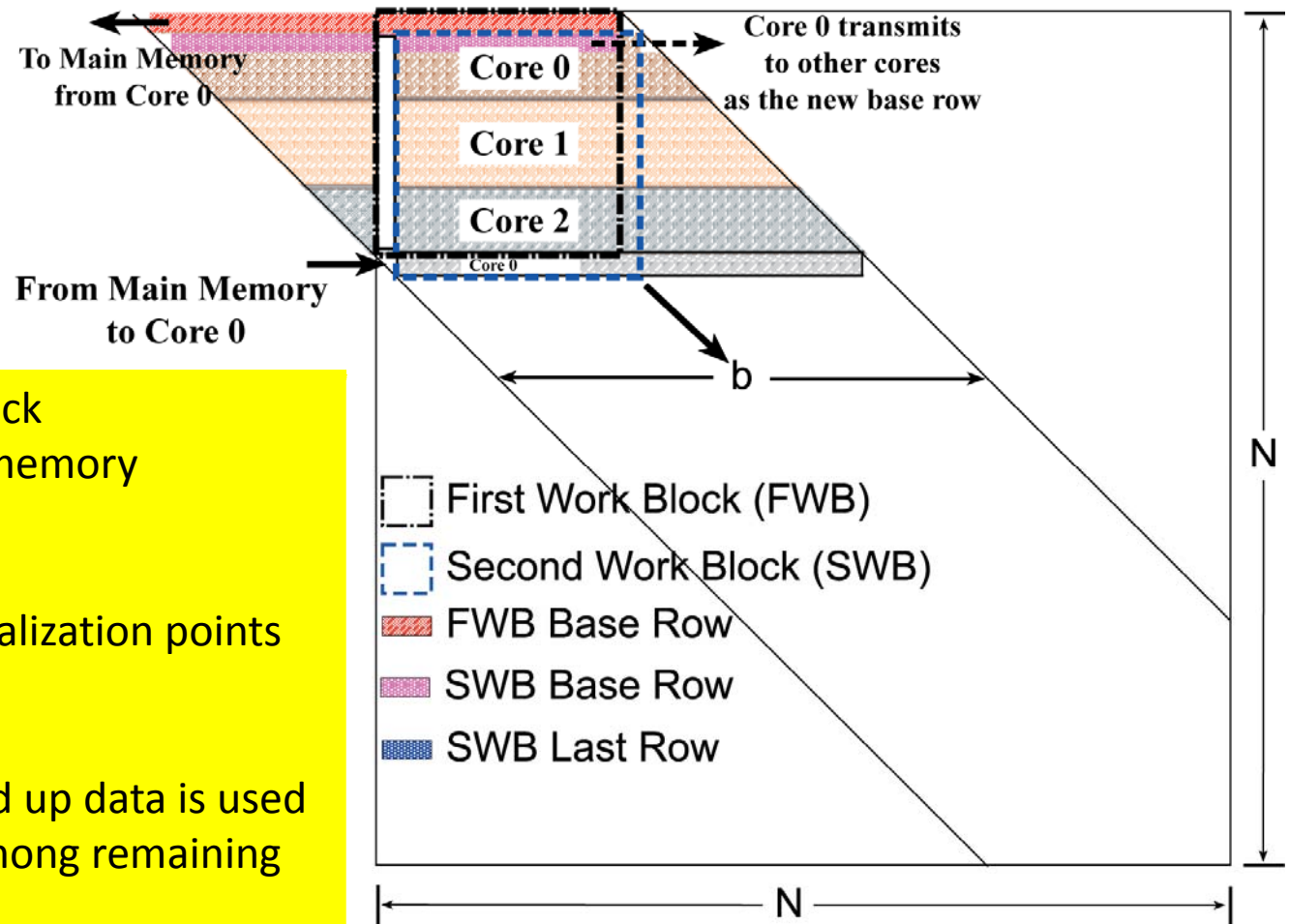
A Fault Tolerant Gaussian Elimination Solver for the Cell Broadband Engine

James Geraci
Lead Researcher
Square Enix Co., Ltd.
Research and Development Division

Introduction to Square Enix Group

- Square Enix Group is a Japanese entertainment content/service developer and publisher.
- Best known for following video game franchises.
 - FINAL FANTASY, DRAGON QUEST (SQUARE ENIX)
 - Tomb Raider (EIDOS)
 - Space Invaders (TAITO)
- Approximately 3000 employees*₁ and ¥135.6 billion*₂ (\$1.5 billion) in sales. *₁ As of March 31, 2009 *₂ FY2008
- Develop for Nintendo DS, PSP, Xbox 360, Playstation 3, Wii, PC, iPhone, cell phones, etc....

Fault tolerant Gaussian elimination

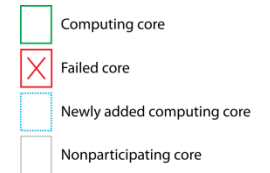


Fault tolerance idea is to back up on-chip data into main memory at checkpoints.

The algorithm's natural serialization points are used as checkpoints.

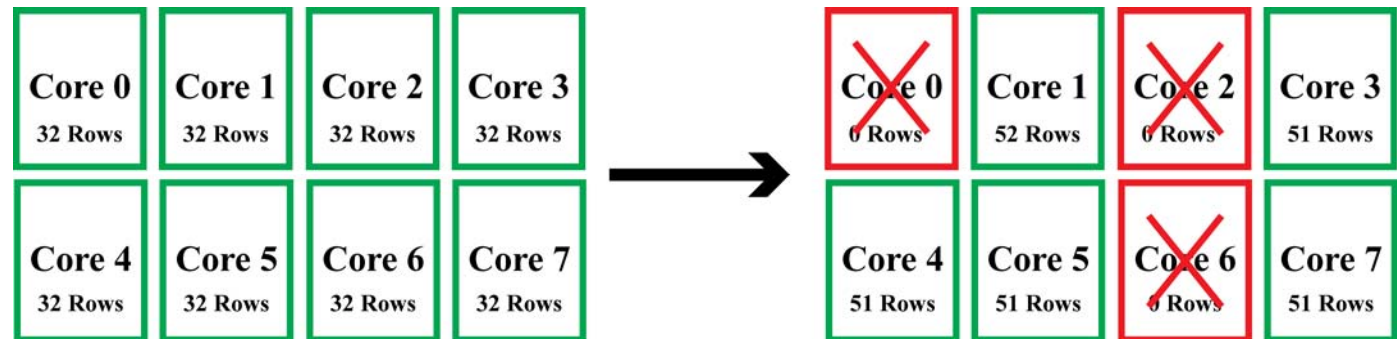
When a fault occurs, backed up data is used to redistribute workload among remaining cores.

Fault Tolerance Capabilities



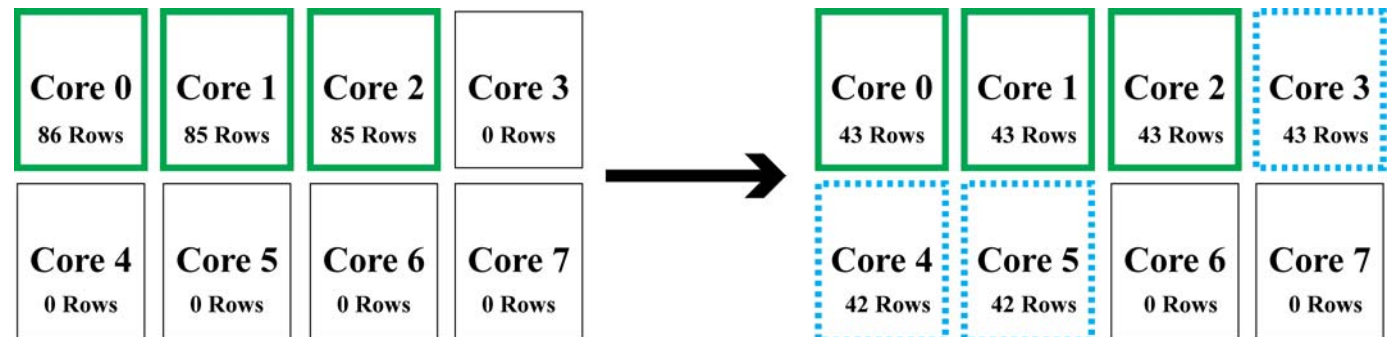
Fault Tolerance:

Core failures lead to redistribution of workload among remaining cores



Addition of Cores:

Cores are added and rows are dynamically redistributed



Fault Tolerance with Replacement:

N failed cores are replaced with M new cores

