A high-performance tuneling magneto resistance device for a read head of hard disk drive

We have developed a high-performance magnetic tunnel junction (MTJ) device with magnesium-oxide as a tunneling barrier. The MTJ device shows low junction resistance and huge magnetoresistance ratio up to 140% at room temperature. It is expected that the MTJ device is applied to highly sensitive read head for ultrahigh-density hard disk drive (HDD) of the next generation.

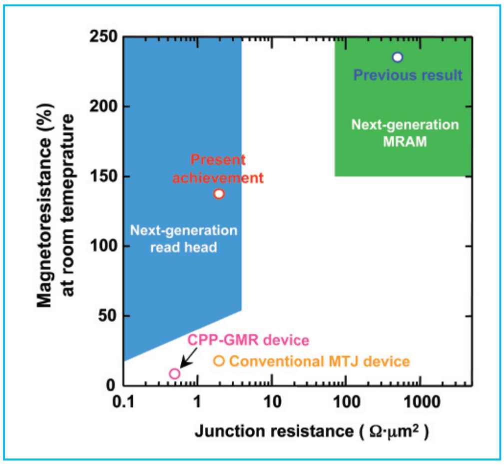

Figure 1: Basic properties of MTJ device required for industrial applications. A higher magnetoresistance is required for all kinds of applications. Concerning the electric resistance of MTJ device, the read head application requires 0.1 ~ 4 $\Omega\cdot\mu m^2$, and the MRAM application requires several 10 $\Omega\cdot\mu m^2$ ~ several $k\Omega\cdot\mu m^2$.

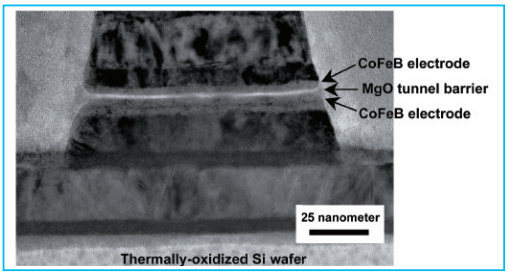

Figure 2: An electron microscopy image of the cross-section of the MTJ device.

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Towards A Production Level of Grids

A stable and dependable grid computing testbed has been highly demanded and strived to build with development and deployment of advanced middleware for several years. Since 2000, ApGrid (Asia Pacific Grid Partnership) has been coordinated by Grid Technology Research Center (GTRC), AIST, partnering with 49 universities and institutions among 15 economies in the Asia Pacific region, however, it is still below the production level computing environment for supporting neither large scale scientific applications nor real business applications. After performing a relatively long- term run of a large scale application for three months, we have analyzed error causes and have introduced new functions to fix them. This article describes our experience and a process of improving the stability of an international grid.

Institution	Country	# CPUs
AIST	Japan	66
TITECH	Japan	9
SDSC	USA	52
NCSA	USA	8
KISTI	S. Korea	17
KU	Thailand	15
NCHC	Taiwan	18
BII	Singapore	16
USM	Malaysia	34
UNAM	Mexico	6

Figure 1: Organizations and numbers of CPUs used for long-time executions.

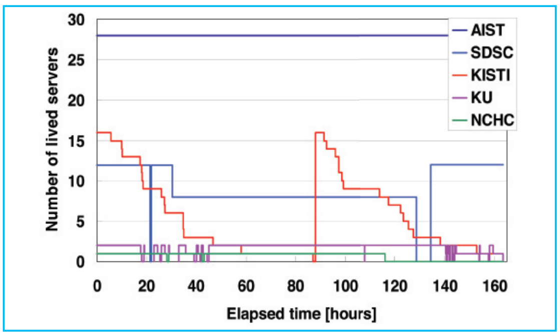

Figure 2: Example result: Transition of available resources.

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