KnightShift: Scaling the Energy Proportionality Wall Through Server-Level Heterogeneity

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How do you accurately quantify energy proportionality?
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\[ DR = \frac{Power_{peak} - Power_{idle}}{Power_{peak}} \]

Dynamic Range
How do you accurately quantify energy proportionality?

\[ EP = 1 - \frac{Area_{\text{actual}} - Area_{\text{ideal}}}{Area_{\text{ideal}}} \]

Energy Proportionality =

\[ DR = \frac{Power_{\text{peak}} - Power_{\text{idle}}}{Power_{\text{peak}}} \]

Dynamic Range
How do you accurately quantify energy proportionality?

Energy Proportionality = $EP = 1 - \frac{Area_{actual} - Area_{ideal}}{Area_{ideal}}$

Dynamic Range

$DR = \frac{Power_{peak} - Power_{idle}}{Power_{peak}}$

Linear Deviation

$LD = \frac{Area_{actual}}{Area_{linear}} - 1$
What can historical Energy Proportionality trends tell us?
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Lessons from the past:
1. Dynamic range improvements has stalled
2. Energy Proportionality has also stalled
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Opportunities for future EP growth
1. To improve EP, we must improve LD
2. Large disproportionality at low utilization
KnightShift Server Architecture

KnightShift improves EP by:

<table>
<thead>
<tr>
<th>Improving Dynamic Range</th>
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<tbody>
<tr>
<td>Closing disproportionality at low utilization</td>
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<tr>
<td>Improving Linear Deviation</td>
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</table>
Come see our talk!

Session IIB – Energy I

British Ballroom

Starting @ 3:30pm