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Application of Ki-67 analysis in a distributed computing infrastructure

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This poster presents an approach to run a Ki-67 analysis within a distributed computing infrastructure and is subdivided into three sections : (I) simplified parallel processing workflow for Ki-67, (II) distributed set-up for a Ki-67 application and (III) results.

I - simplified processing workflow

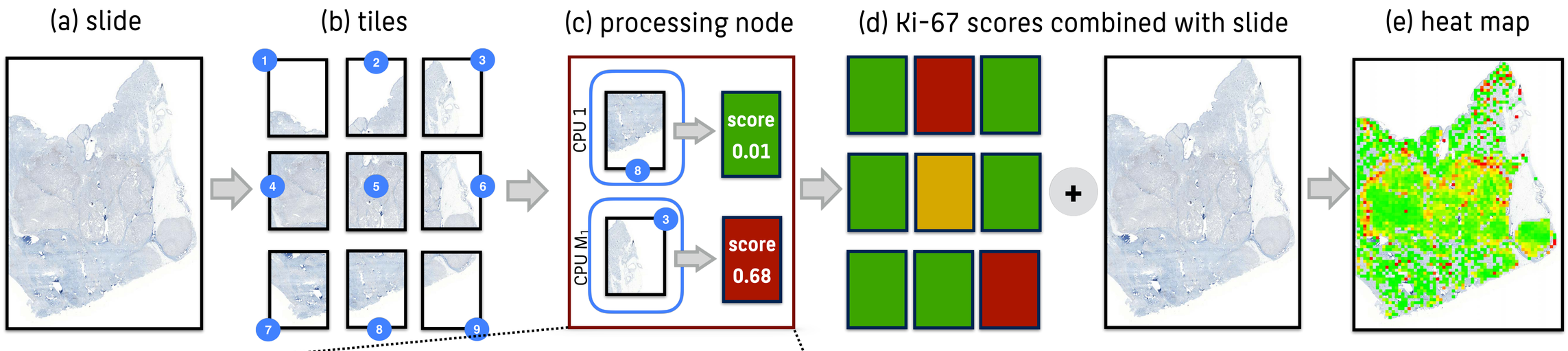
(a) overview of a WSI with a dimension of 67,584 x 93,952 pixels

(b) splitting WSI into 1,024 x 1,024 px tiles

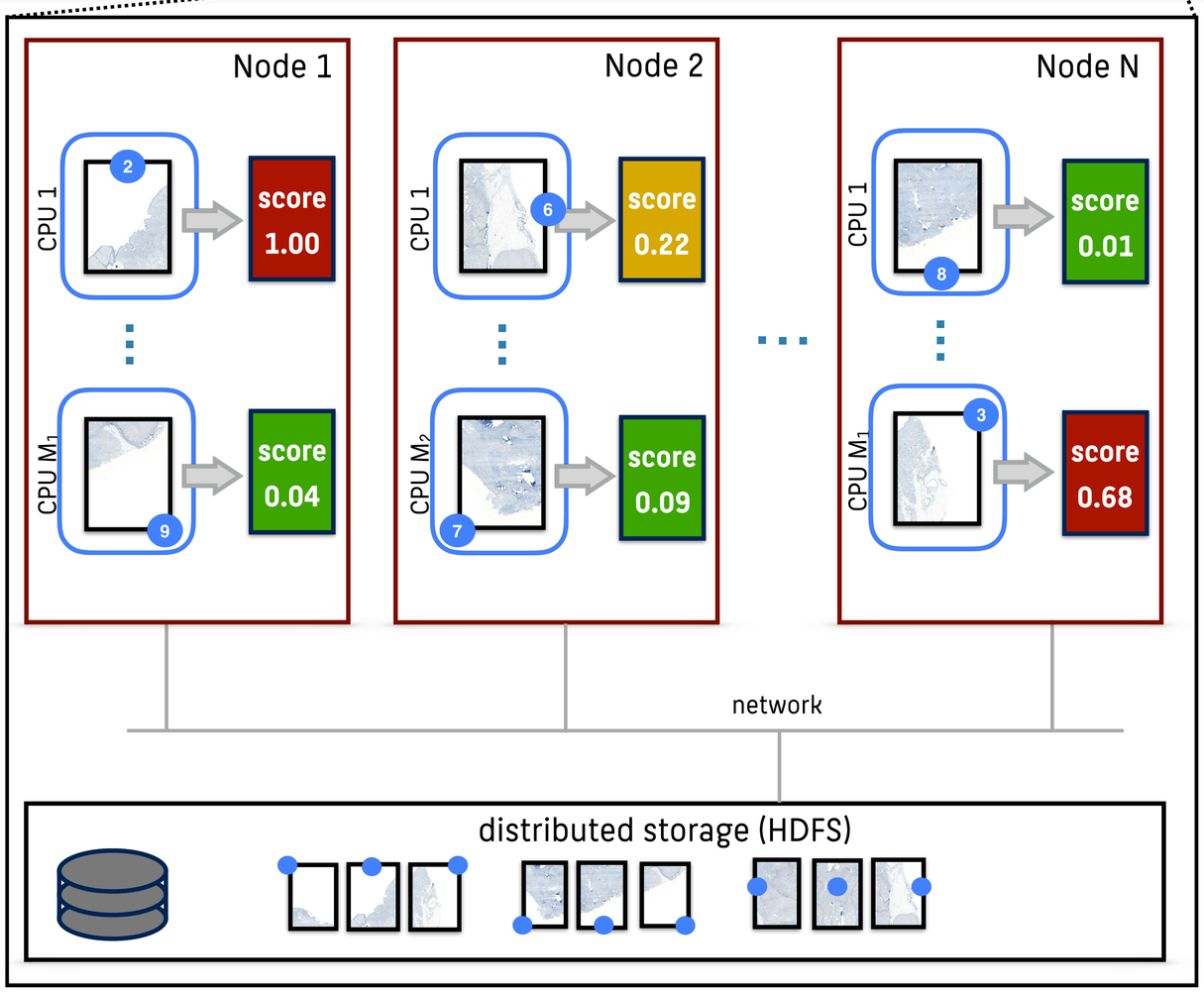
(c) running a Ki-67 analysis on each tile on a computing node

(d) transforming Ki-67 scores to a heat map and combining with original WSI

(e) color-encoded Ki-67 score for all tiles as result



II - distributed set-up for Ki-67



Computing Cluster

- Linux environment
- Cluster 1:

  6 Nodes, 72 CPUs @ 2.20GHz, 288 GB RAM
- Cluster 2:

  6 Nodes, 70 CPUs (Intel + AMD), 176 GB RAM
- Ki-67 analysis executed by open source .NET framework (Mono)
- Tiles are stored within a distributed filesystem (HDFS)

III - results

10 x faster computation time

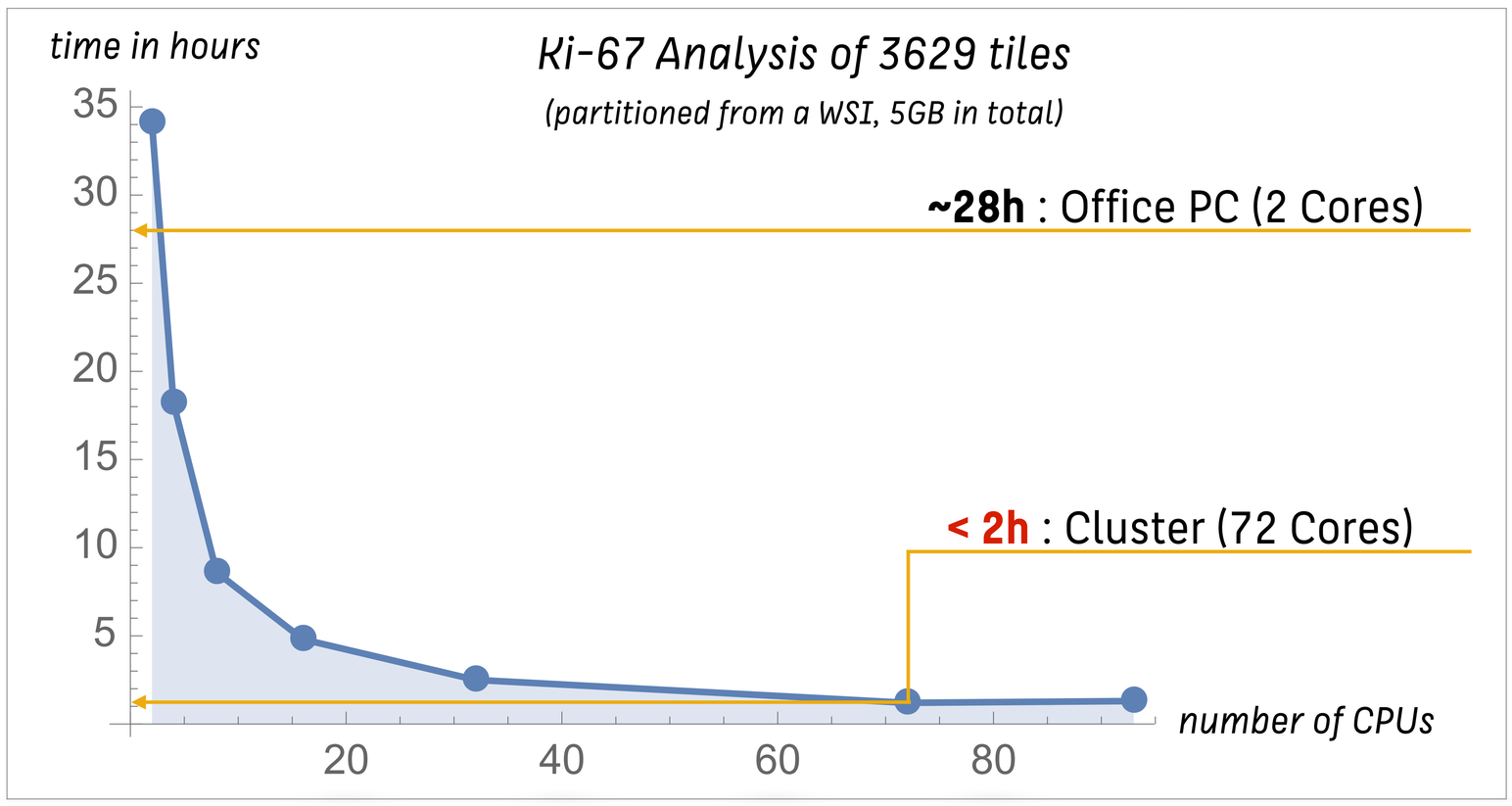
- before:

  28 h on a typical office PC
- after:

  1.5 h on a cluster

  -> more than 10x faster

  (using 72 CPU cores)
- speedup increases linearly with the number of tiles



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