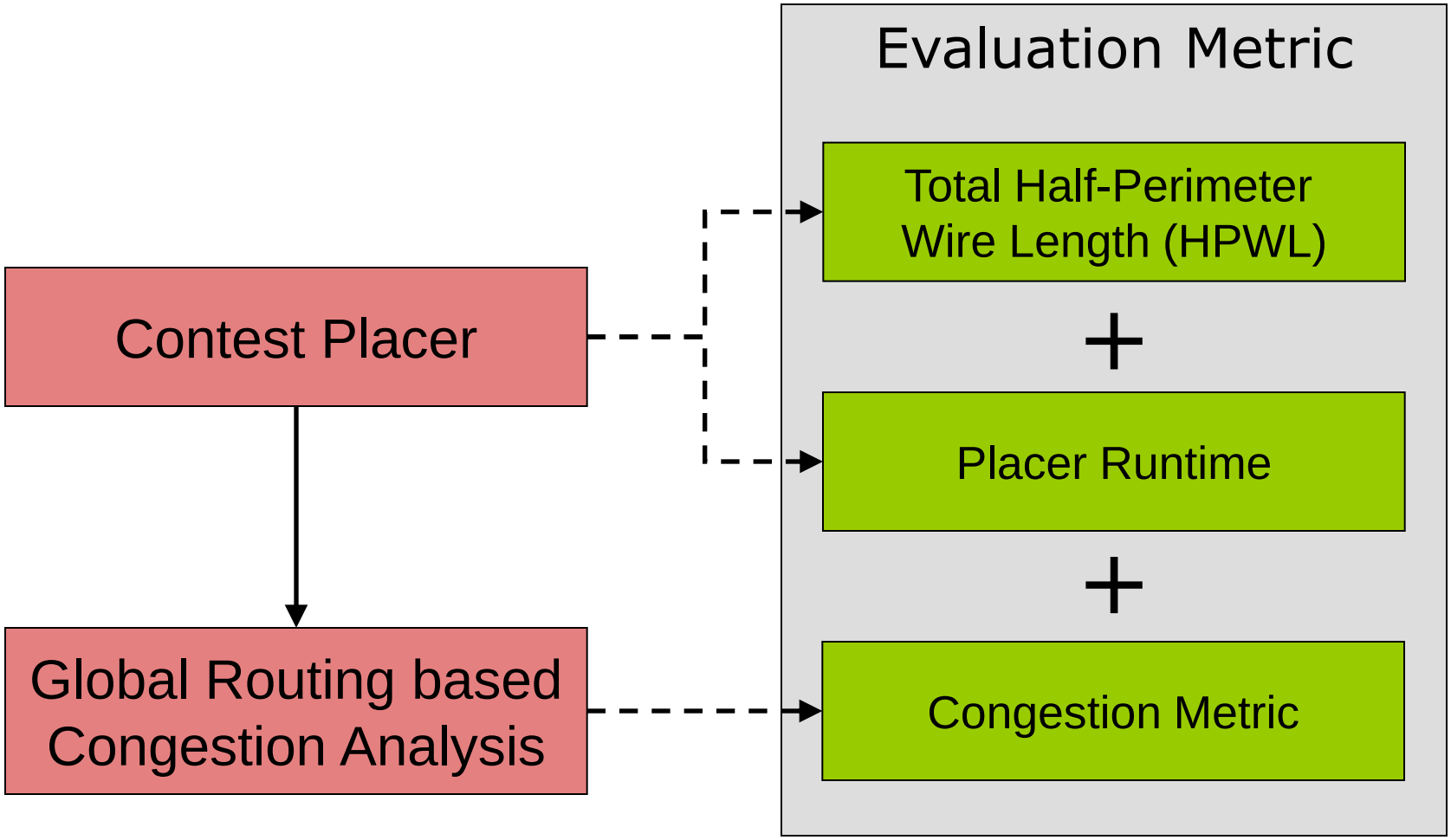
DAC 2012 Contest
Routability-Driven Placement

http://archive.sigda.org/dac2012/contest/dac2012_contest.html

Contest Evaluation

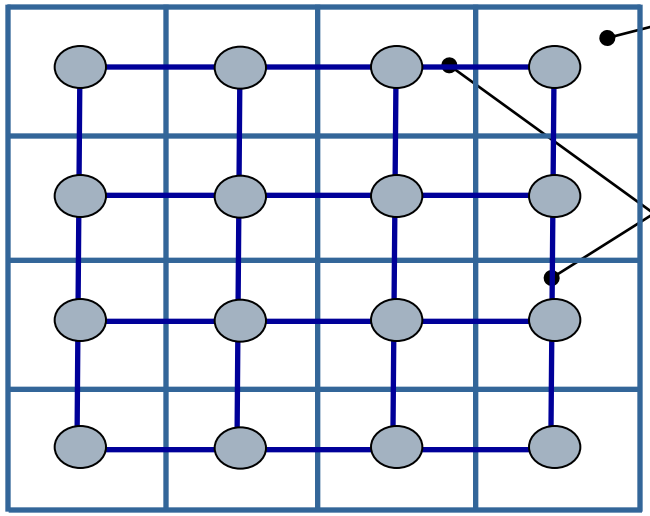
Natarajan Viswanathan
IBM Corporation, Austin, TX
(nviswan@us.ibm.com)

Contest Flow and Evaluation



Definition of Congestion

Global Routing Grid Graph



Global Routing Grid Cell (g-cell)

Global Routing Graph Edge (g-edge)

For a g-edge (e) on a particular metal layer:

- c_e : Total or maximal capacity of edge e
- b_e : Routing blockage on edge e
- w_e : Routing demand on edge e

Congestion of g-edge e (in percent)
$= 100 * ((w_e + b_e) / c_e)$

Congestion Metric

- Based on the histogram of g-edge congestion

- ACE(x)
  - **A**verage **C**ongestion of the top x% congested g-**e**dges (across all layers)
  - $x \in \{0.5, 1, 2, 5\}$

Contest Metric Excluding Runtime

Peak_Weighted_Congestion (PWC):

$$PWC = \frac{k_1*ACE(0.5) + k_2*ACE(1) + k_3*ACE(2) + k_4*ACE(5)}{k_1 + k_2 + k_3 + k_4}$$

Routing_Congestion (RC):

RC = MAX(100, PWC)

Contest Evaluation Metric = Scaled Wire Length

= HPWL * (1 + PF*(RC - 100))

Constants

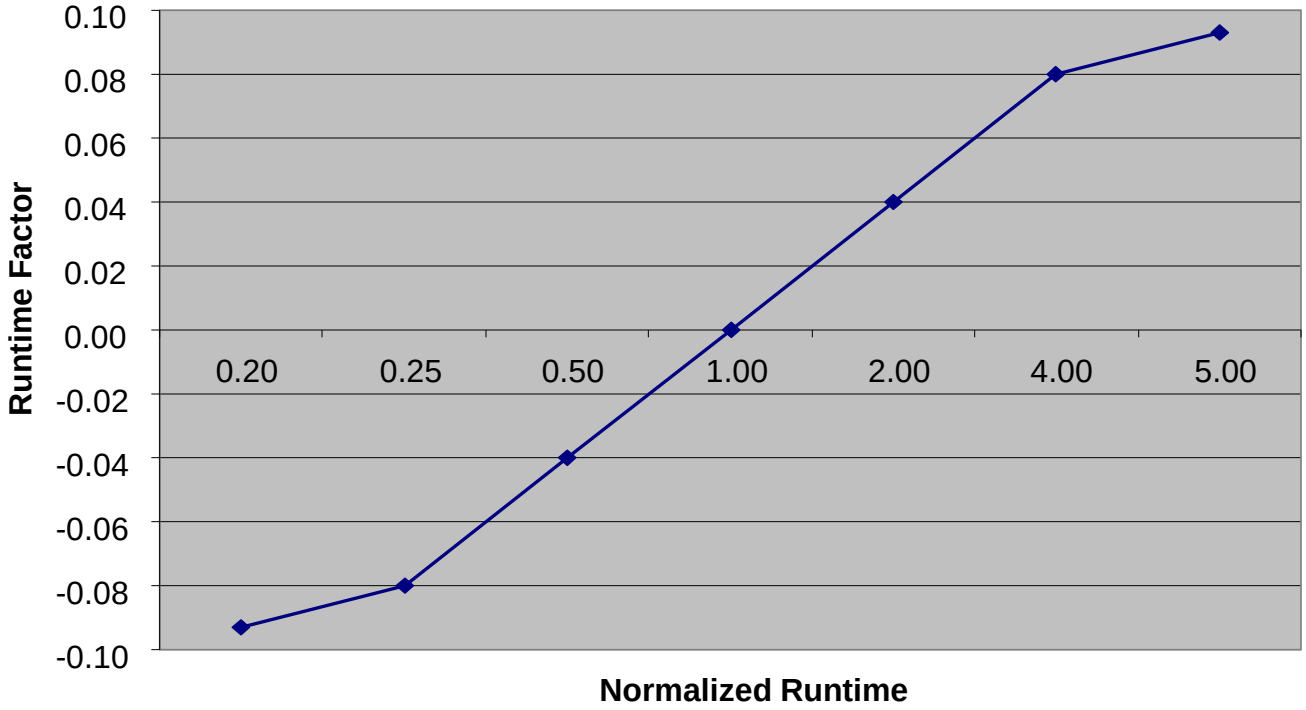
- $K_1 = k_2 = k_3 = k_4 = 1.0$ (subject to change)
- PF = 0.03 (subject to change)

Interpretation of the metric:

For every 1% excess Routing_Congestion (> 100%), there is a 3% wire length penalty

Runtime Factor

- For each design, measure wall times for all placers
- Normalized Runtime = Placer_Wall_Time / Median_Wall_Time
- Runtime Factor:



- ±4% advantage for a 2X speed-up/slow-down
- Maximum runtime factor set to 10%

Final Quality Metric

Scaled Wire length considering congestion and runtime:

HPWL * (1 + PF*(RC - 100)) * (1 + Runtime_Factor)