

WASEDA UNIVERSITY

Before: Webserver with **operating system DFVS-control**

🕅 WAVE LOGGER - [eval_setting_long(1)]	
図 ファイル(E) 収集(M) 編集(E) 表示(V) カーソル(C) 環境(S) Excel転送/CSV(T) ウィンドウ(M)	ヘルプ(圧)
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	.0000
4.0000 Power 4	.0000
	ol lag 324 MHz
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	3.0000 3.0000 "conservative"
System - Power	
	2.5000 2.5000
-3.0000 Control -3	
	2.0000 2.0000
-4.0000 "ondemand" -4	
-5.0000 -5	
13:24:08 13:24:12 13:24:	O.5000 O.5000 OScillations
	0.0000 0.0000

Now: Webserver with application-level **DFVS-control**

	[eval_setting_long(1)] 編集(の) 東子(A) カーソル(の) 現	境(S) Exce康送/CSV(T) ウィンドウ(M	λ ∧ u.⊐/(H)					
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-2.0000-		-2.0000			-2.0000-			
-3.0000-		-3.0000			-3.0000			
-4.0000-	Δr	plication	- Powe	r Contro	-4.0000-			
-5.0000		-5.0000			-5.0000			
	11:49:46	11:49:50	11:49:54	11:49:58	11:50:02			
						収集中		

DFVS depends on HTTP-transfer type

- compressed
- @ 648 MHz
- uncompressed @ 162 MHz

Application Power Control

Opportunities and Challenges of Application-Power Control in the Age of Dark Silicon

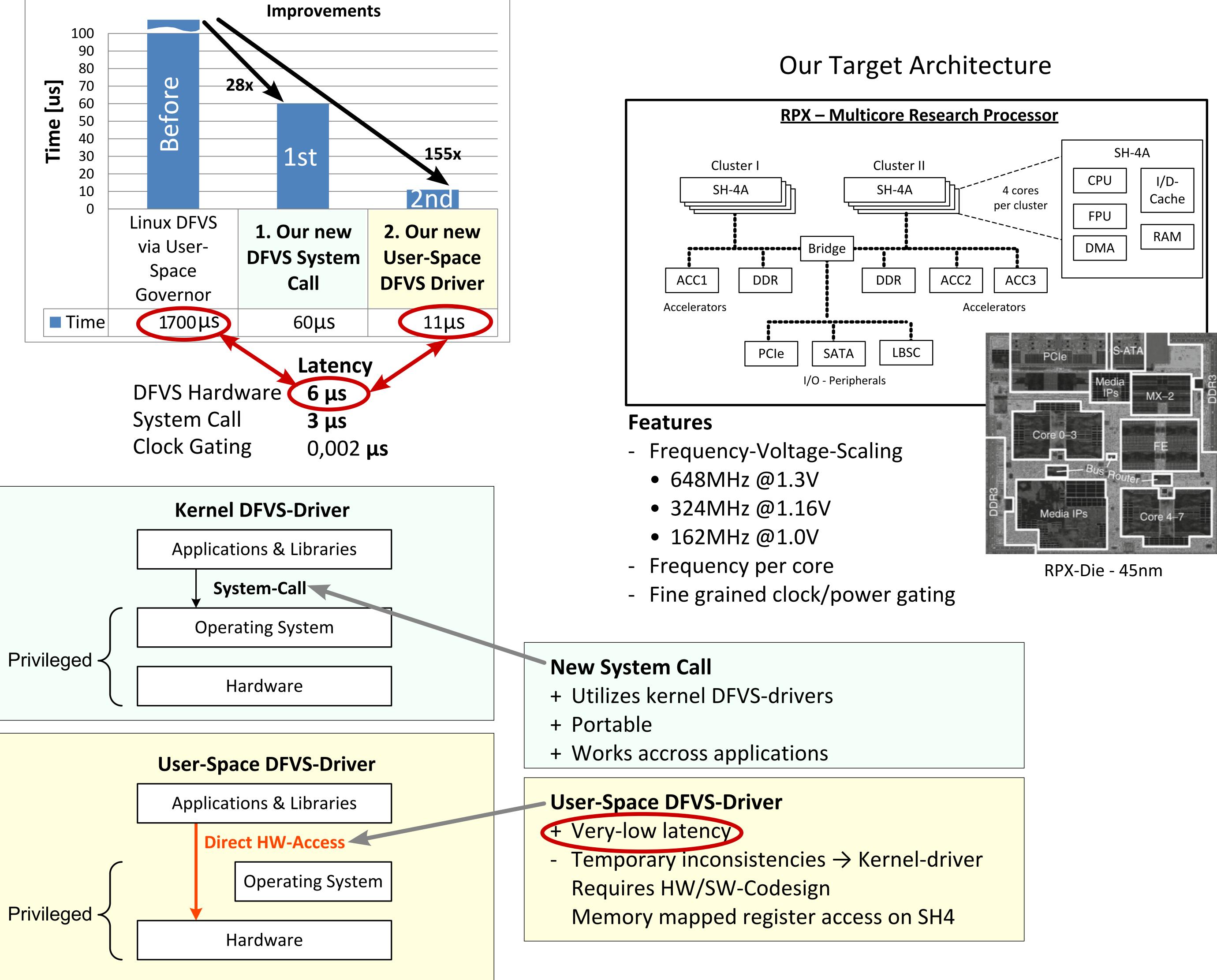
Dominic Hillenbrand, Yuuki Furuyama, Akihiro Hayashi, Keiji Kimura, Hironori Kasahara

Our **Two** Approaches to Low Latency DFVS



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Improvements 100 90 [ns] **28**x 70 efor 60 50 Time \mathbf{m} 20 10 0 Linux DFVS 1. Our new via User-DFVS System Space Call Governor 1700µS 60µs Time Latency DFVS Hardware 6 μs System Call **3 μs** Clock Gating **Kernel DFVS-Driver Applications & Libraries**



HiPEAC 2013, 21-23 January 2013, Berlin, Germany



Green Computing Systems R&D Center Department of Computer Science and Engineering



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