

pDNS: Parallelizing DNS Lookups to Improve Performance

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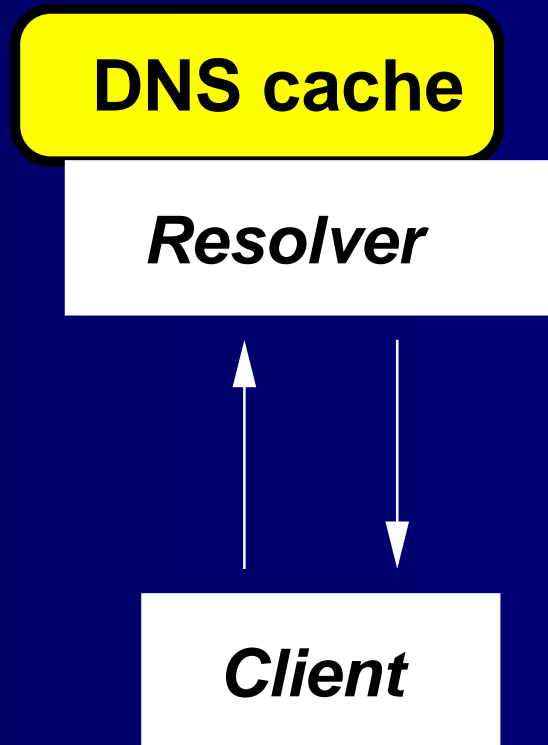
Introduction

- DNS works quite well – 80% of queries are resolved within 300 ms (Jaeyeon Jung and Morris, 2001).
- But, 10% of queries are slow (>2 s).
- Goal: speed up slow queries
 - only NS-records matter
 - not too many NS-records (about 500,000 NS at present)

Overview

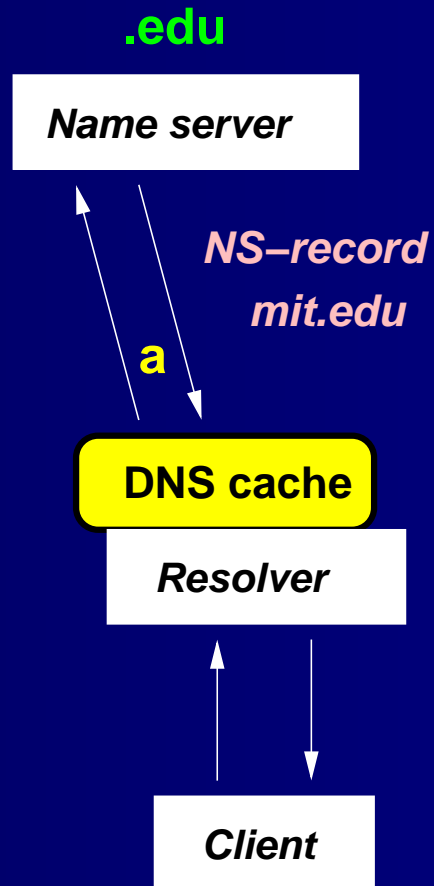
- pDNS: overlay network – Members are resolving name servers
- By joining pDNS, they can provide better response for their customers.
- Requires more work, but additional cost is modest.
- Essentially, a **cooperative caching scheme** for NS-records.

Current (Sequential) DNS Lookup



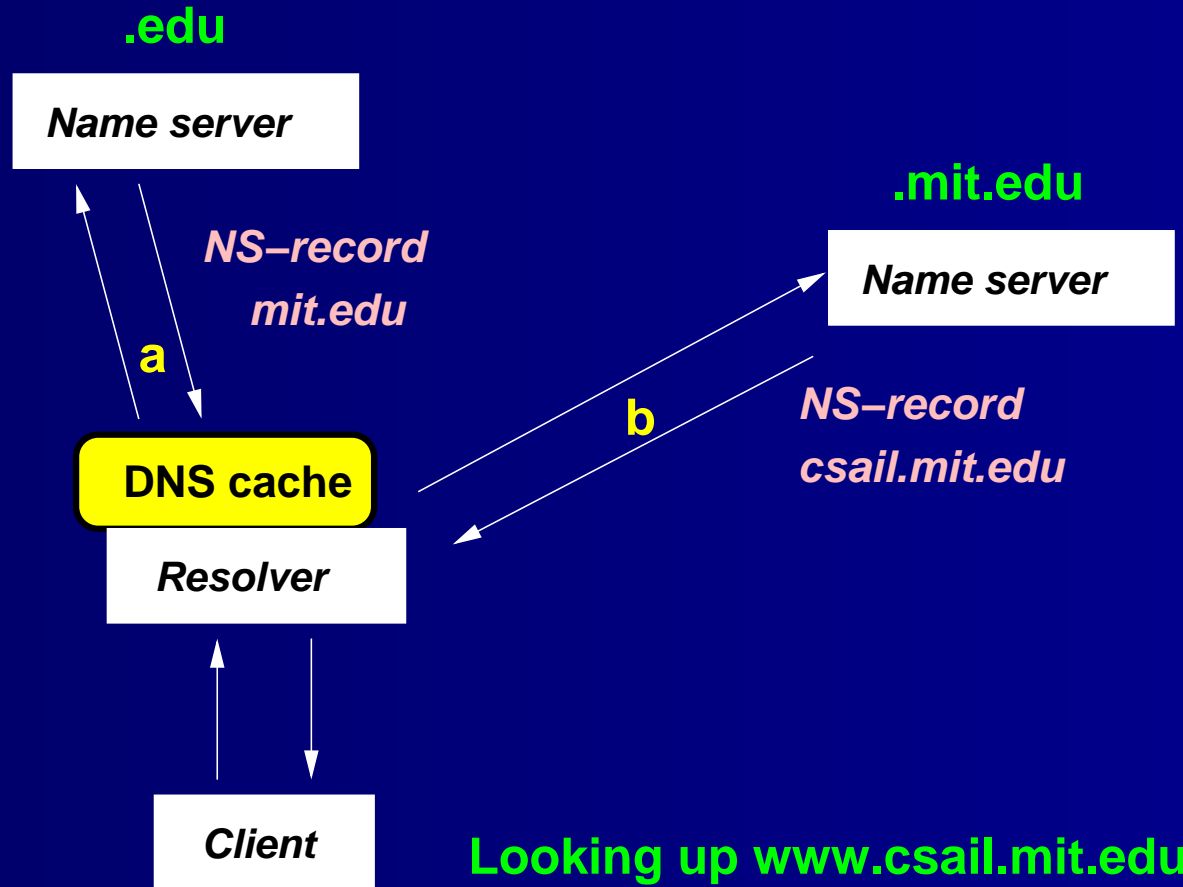
Looking up www.csail.mit.edu

Current (Sequential) DNS Lookup

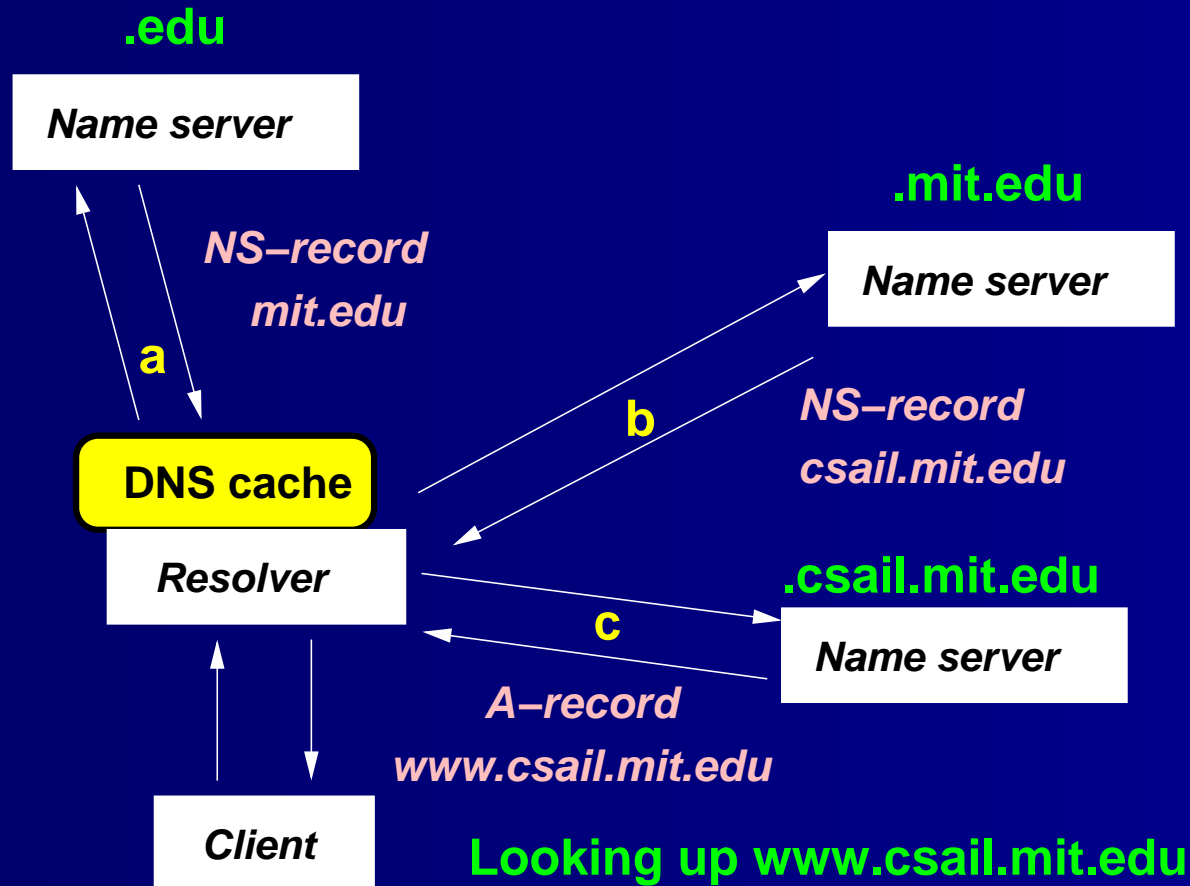


Looking up **www.csail.mit.edu**

Current (Sequential) DNS Lookup

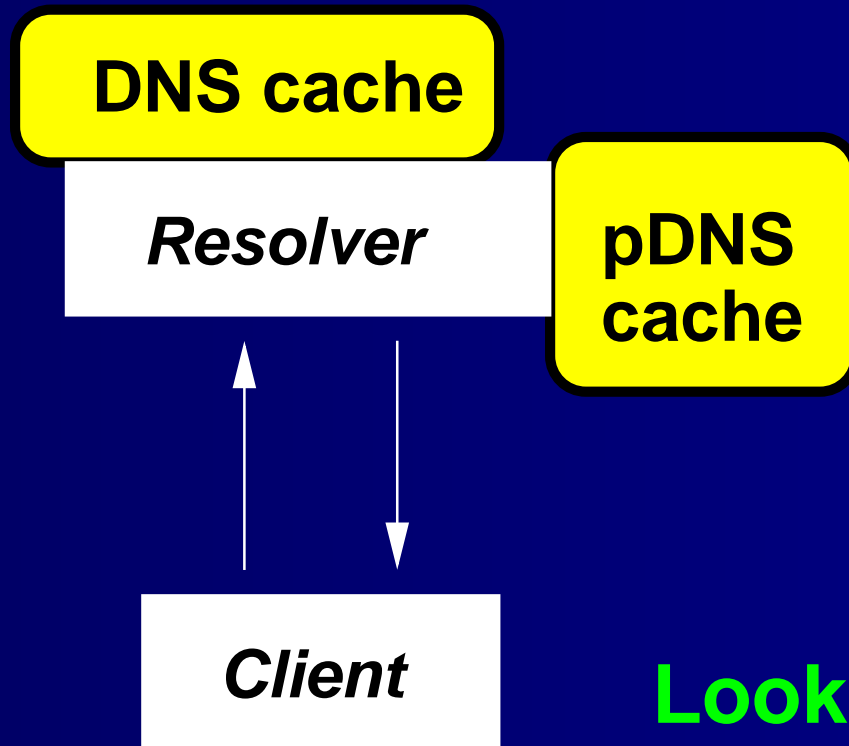


Current (Sequential) DNS Lookup



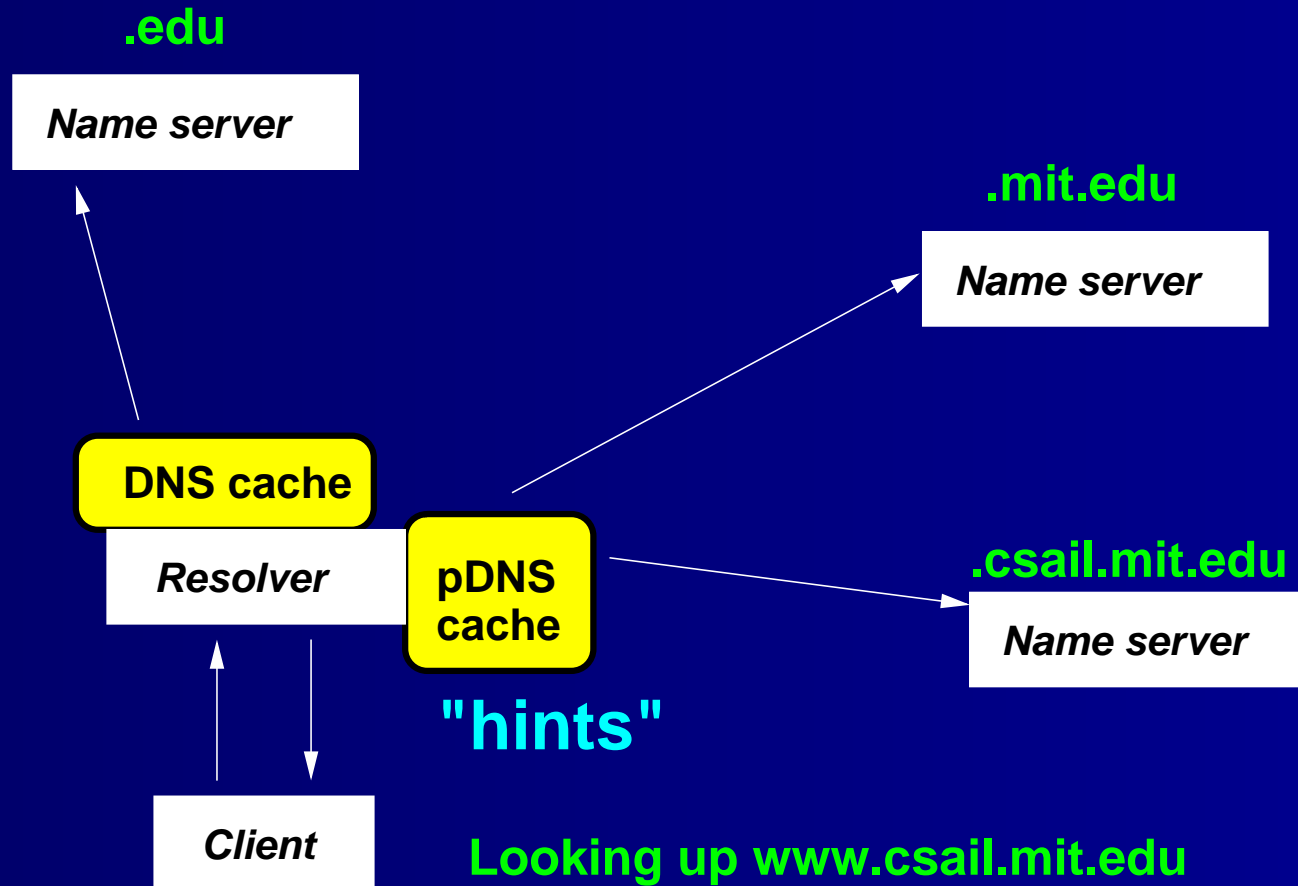
Total latency: a + b + c

pDNS Parallel DNS Lookup

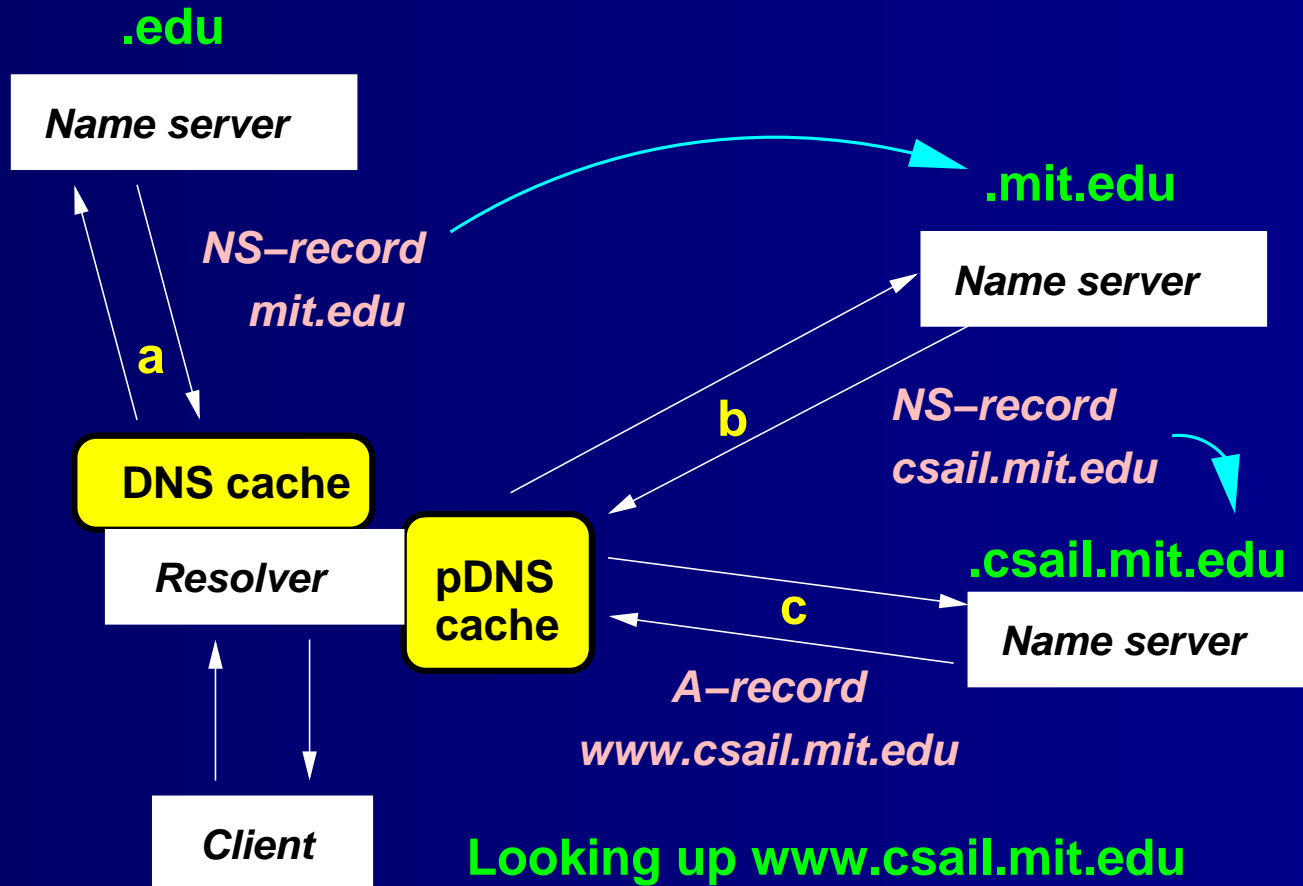


Looking up www.csail.mit.edu

pDNS Parallel DNS Lookup



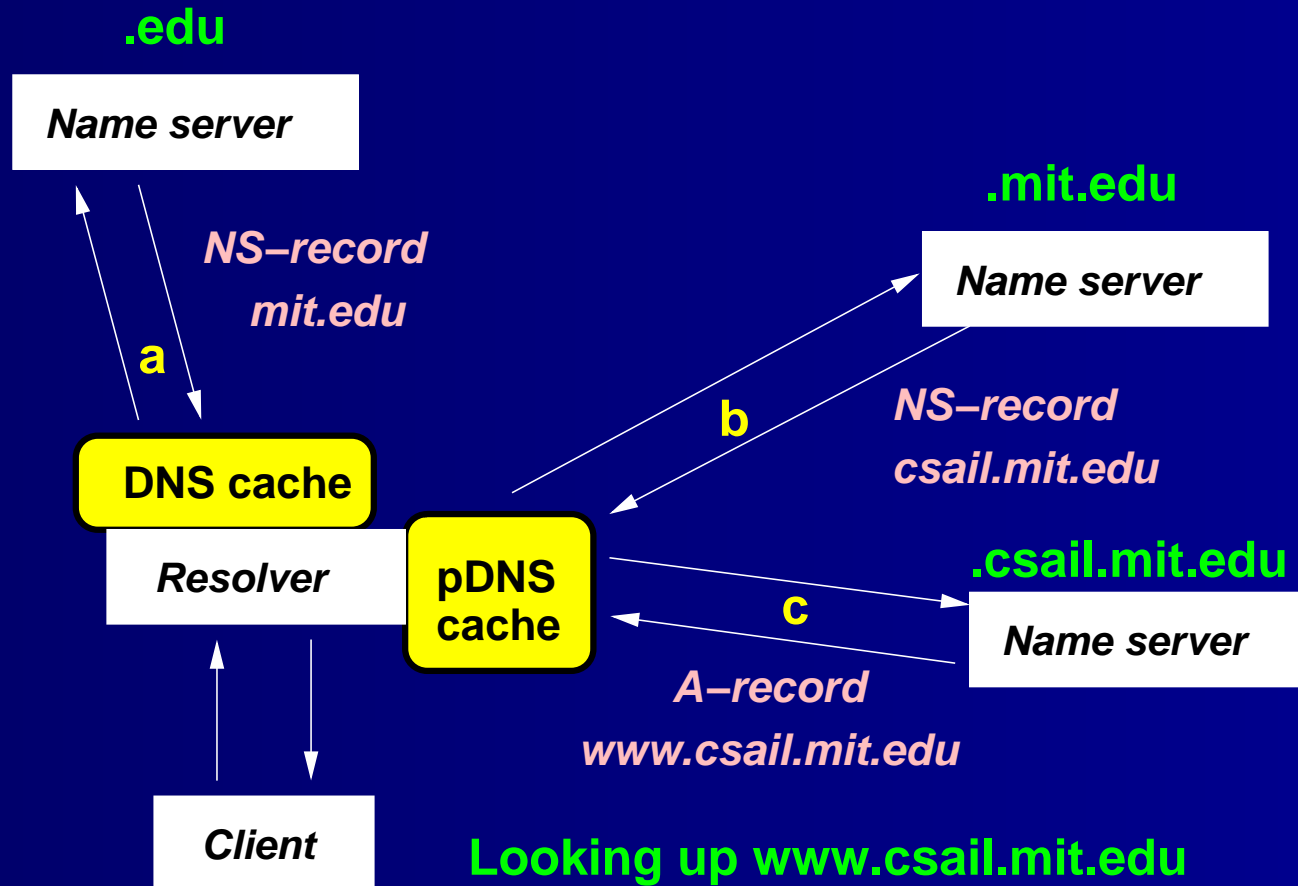
pDNS Parallel DNS Lookup



Check that answers are consistent

Returned answer is as secure as that for current DNS

pDNS Parallel DNS Lookup



Total latency: $\max(a,b,c)$

Maintaining NS-record Caches

- New information is broadcast on overlay network
 - Unreliable broadcast over ad hoc trees
 - Duplicate suppression
 - NS-records do not time out
- ⇒ Cost is modest

Where We Are

- Basic Scheme – parallel lookup
 - Check consistency of responses
 - Broadcast using ad hoc trees
- Faster Scheme – use only last hop
 - Need admission control
 - Use **committees** to verify NS-records
 - Refresh only popular NS-records
- Need to perform experiments

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References

Jaeyeon Jung, Emil Sit, H. B. and Morris, R. (2001). DNS performance and the effectiveness of caching. In *Proceedings of the ACM SIGCOMM Internet Measurement Workshop '01*, San Francisco, California.