Competing DNS Roots:

Creative Destruction or Just Plain Destruction?

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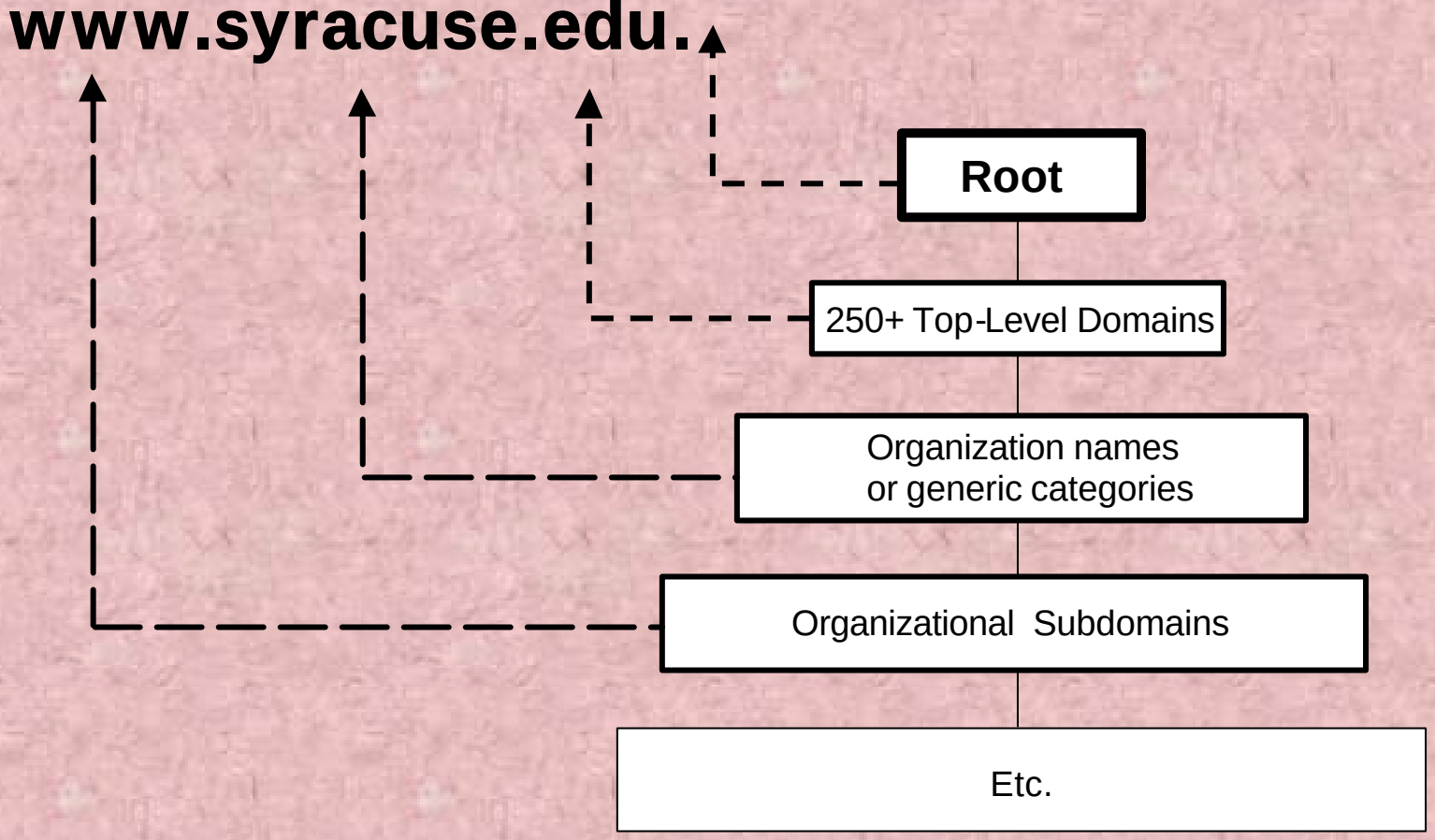
DNS hierarchical structure



The DNS Root

- Root Zone File contains “authoritative” list of top-level domains, with pointers to name servers for the next level of the hierarchy
- Zone file is distributed via “authoritative” root server system

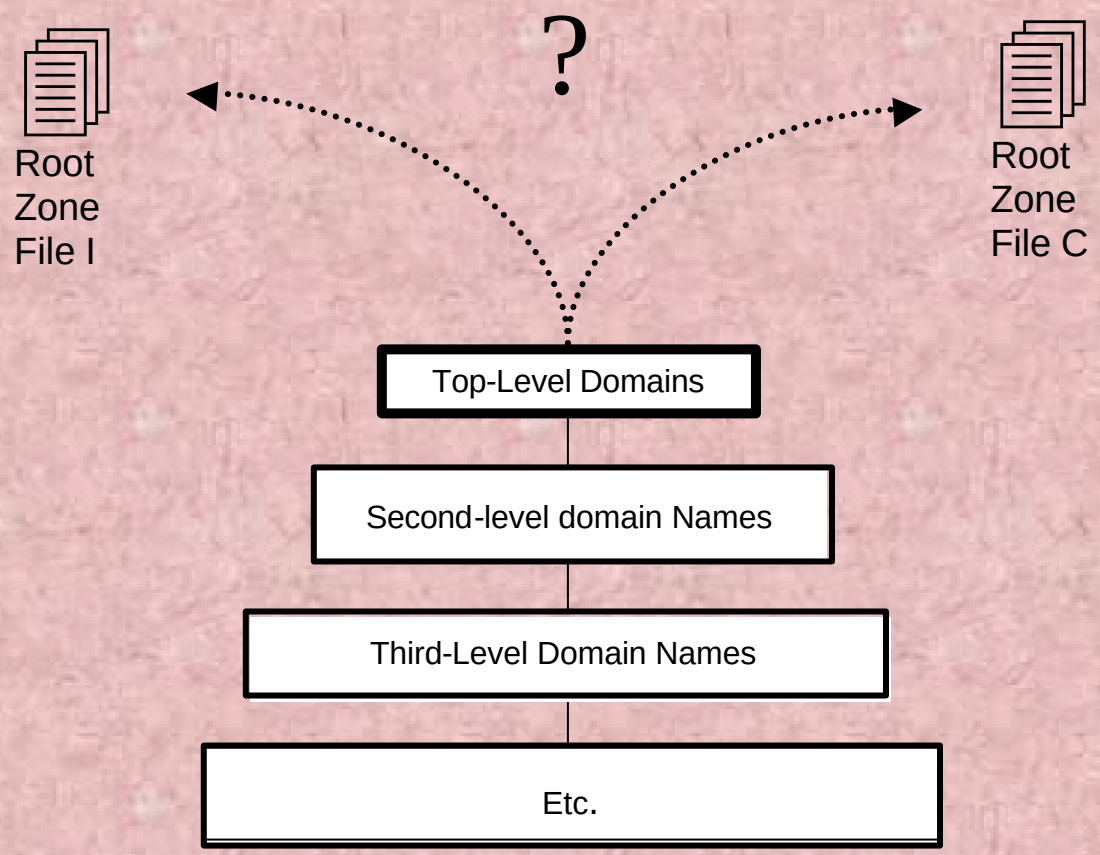
Example of a Root Zone File

TLD String	TTL	Class	Name Servers	
geek.	172800	IN	NS	ns0.opennic.glue.
geek.	172800	IN	NS	ns1.opennic.glue.
geek.	172800	IN	NS	ns2.opennic.glue.
null.	172800	IN	NS	ns3.opennic.glue.
null.	172800	IN	NS	ns4.opennic.glue.
null.	172800	IN	NS	ns6.opennic.glue.
parody.	172800	IN	NS	ns0.opennic.glue.
parody.	172800	IN	NS	ns1.opennic.glue.

Competing roots

- Anyone can create and operate a DNS name server and call it a “root”
- Root competition occurs when:
  - Organizations define their own root zone file and compete to persuade ISPs, other name server providers, and end users to direct root-level DNS queries to them
- There are strong network externalities in use of a common or compatible root
  - Names assigned from different roots may not resolve

Competing Roots



Compatibility Relationships

- Competing roots can take 3 forms:
- Type 1 Competition
  - The zone files of Root-I and Root-C have identical contents due to mutual recognition and coordination
- Type 2 Competition
  - Root-C adds top-level domains to those supported by Root-I, but for those TLDs in common, the contents of the root zone are identical.
- Type 3 Competition
  - One or more conflicting assignments of top-level domains. TLD name servers contain different zone file contents for the conflicting assignments. Could lead to cache pollution.

Type 2 Compatibility relations

	Origin of name query	
Origin of name assignment	**User of Root I**	**User of Root C**
Root I	Compatible	Compatible
Root C	**Incompatible**	Compatible

Type 3 Compatibility relations

	Origin of name query	
Origin of name assignment	**User of Root I**	**User of Root C**
Root I	Compatible (except for cache pollution)	**Incompatible**
Root C	**Incompatible**	Compatible (except for cache pollution)

Type 1 Competition: policy issues

- When should a dominant DNS root recognize and coordinate with a competing root?
- For ICANN, recognition of another DNS root undermines its policy leverage
- In any case, some criteria for distinguishing between “serious” and “silly” DNS roots must be established
  - New.net proposal (cable programming network analogy)

Type 2 Competition: policy issues

- What happens when the Incumbent root wants to add new TLDs? Two options:
  - Avoidance of conflict
    - Tacit recognition of the competing root
    - Constrained choices of TLD strings
  - Conflicting TLD assignments
    - Transforms Type 2 competition into Type 3
    - Creates compatibility problems for both roots
    - Dominant root likely to drive out smaller root

What sustains alt. roots?

- Competing root operators must fight an uphill battle against network effects
- The added value of new TLDs is minimal relative to the expense and risk of fighting that battle
  - Would you put your company's web site out of reach of 90% of the Internet just so you could name it mysite.web instead of mysite.com?

It's the market, stupid

- Competing roots are a byproduct of restricted supply of TLDs
- There is a strong market for new top-level domain names
  - Hundreds of willing suppliers
  - Hundreds of thousands, perhaps millions, of willing consumers
- ICANN deliberately suppresses that market
  - Its pretense that there are technical risks not supported by Vixie, Mockapetris, Auerbach, Hoffman, or any systematic engineering studies

Historical evidence for the restricted supply thesis

- Competing roots' origin in 1995-6
  - Efforts to overcome Network Solutions' monopoly
  - Paralysis over creating new TLDs led to first competing roots (AlterNIC, Name.space, gTLD-MoU)
- Fortunes of alternate roots rise and fall depending on prospects of new TLDs
  - Alt.root activity diminishes 1998 as hope of new TLDs rises with Green and White Papers
  - Emerge again after ICANN's restrictive decision

Logical evidence

- Alternate roots pursue Type 2 competition, not Type 3
  - I.e., they retain strive to compatibility with ICANN root
- All major operators and proponents of alternate TLDs applied for access to the ICANN root (and were rebuffed)
  - New.net, .web, .kids, Name.space
  - Paid $50,000 non-refundable fee

Conclusions

- Banning alternate roots is inadvisable
  - May not even be possible
- Competing roots provide an important check on abuses or bad economic policies of the dominant root operator
- Incompatibilities of competing roots serve as a significant check on their acceptance.
  - Currently, danger of abuse of power by dominant root operator much greater than any major incompatibility risk caused by alt.root efforts