Using Node Access

DrupalCON Szeged 2008

Ken Rickard
Moshe Weitzman

Agenda: The Big Questions

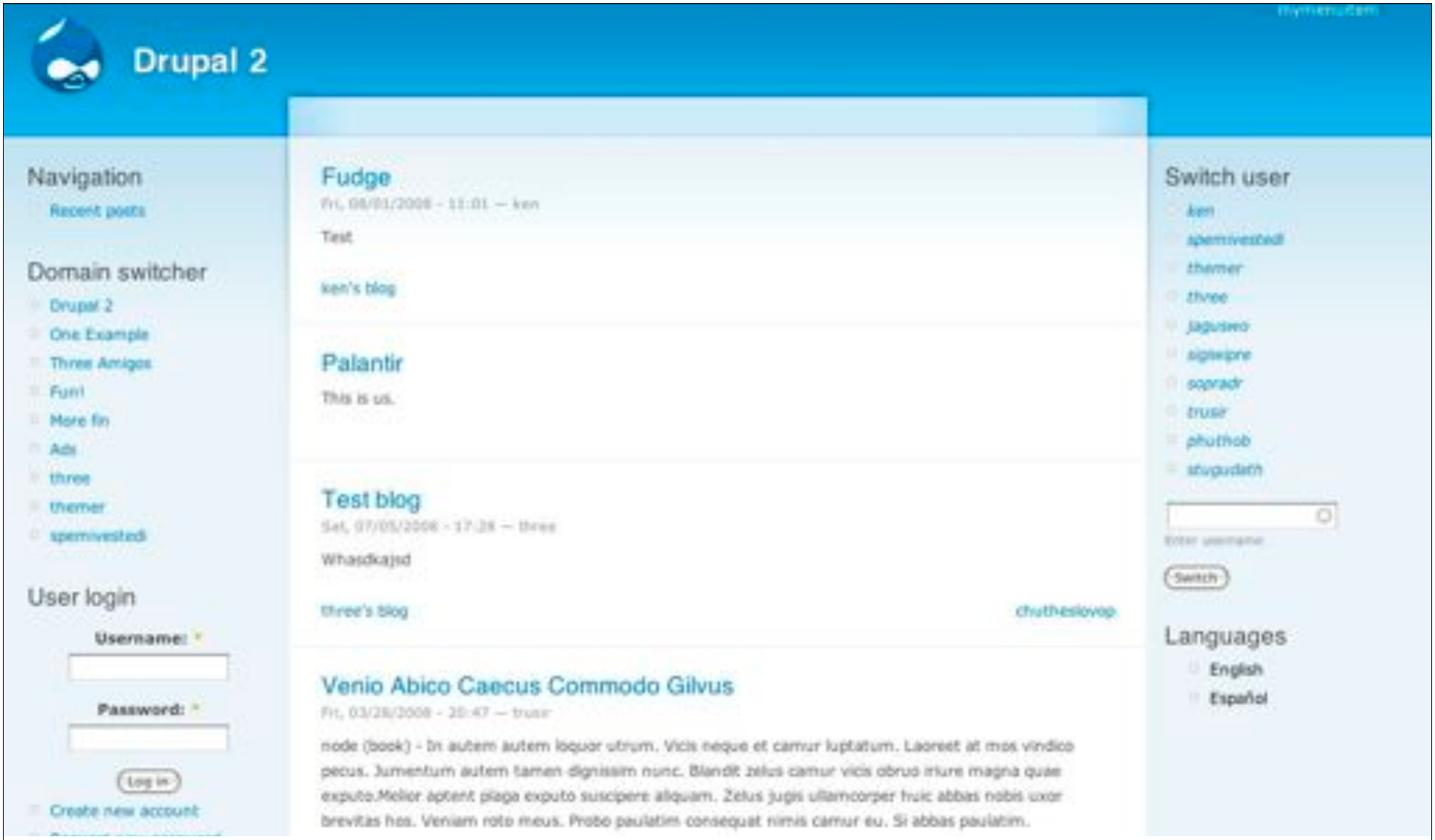
- What is Node Access?
- How does Node Access work?
- What modules provide Node Access?
- Why does Node Access not do [insert feature X here]?
- How can we improve Node Access for Drupal?

Agenda: Node Access APIs

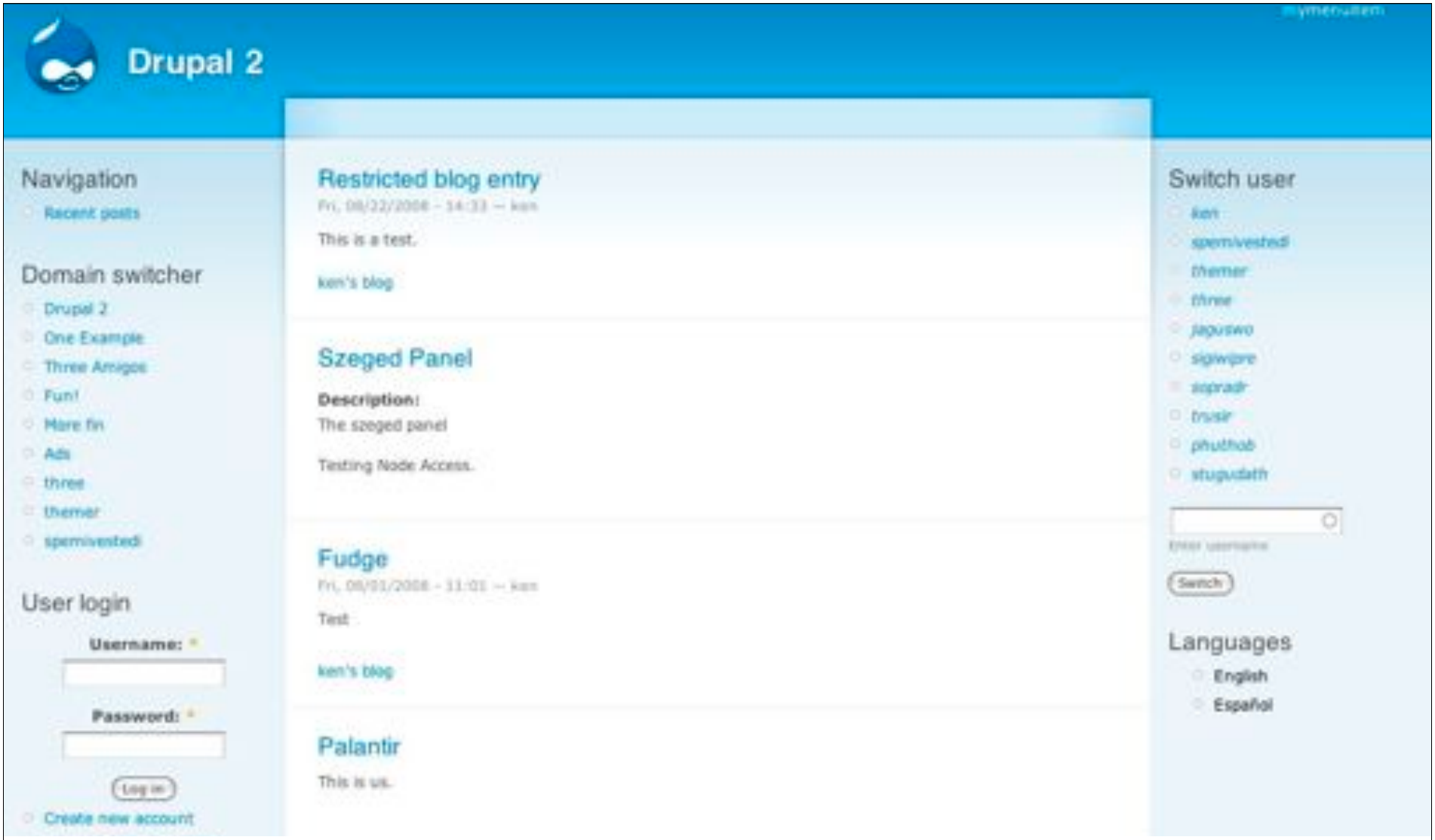
- Node Access terminology
- Defining access realms
- Defining access grants
- Development tools
- Best practices

What is Node Access?

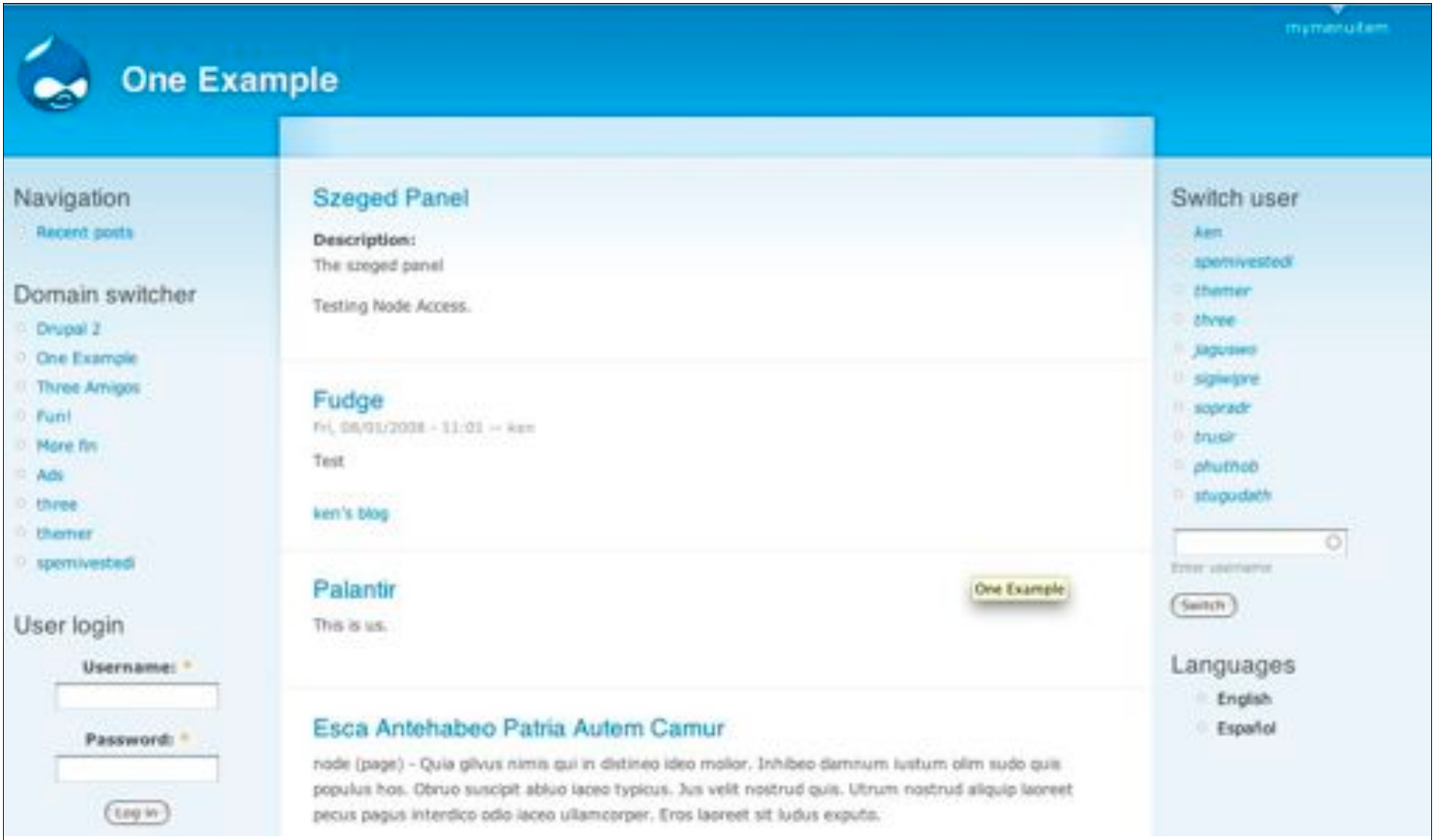
- Drupal's system for regulating which users can see which content.
- A function in the core Node module.
- An API for defining access to node content.



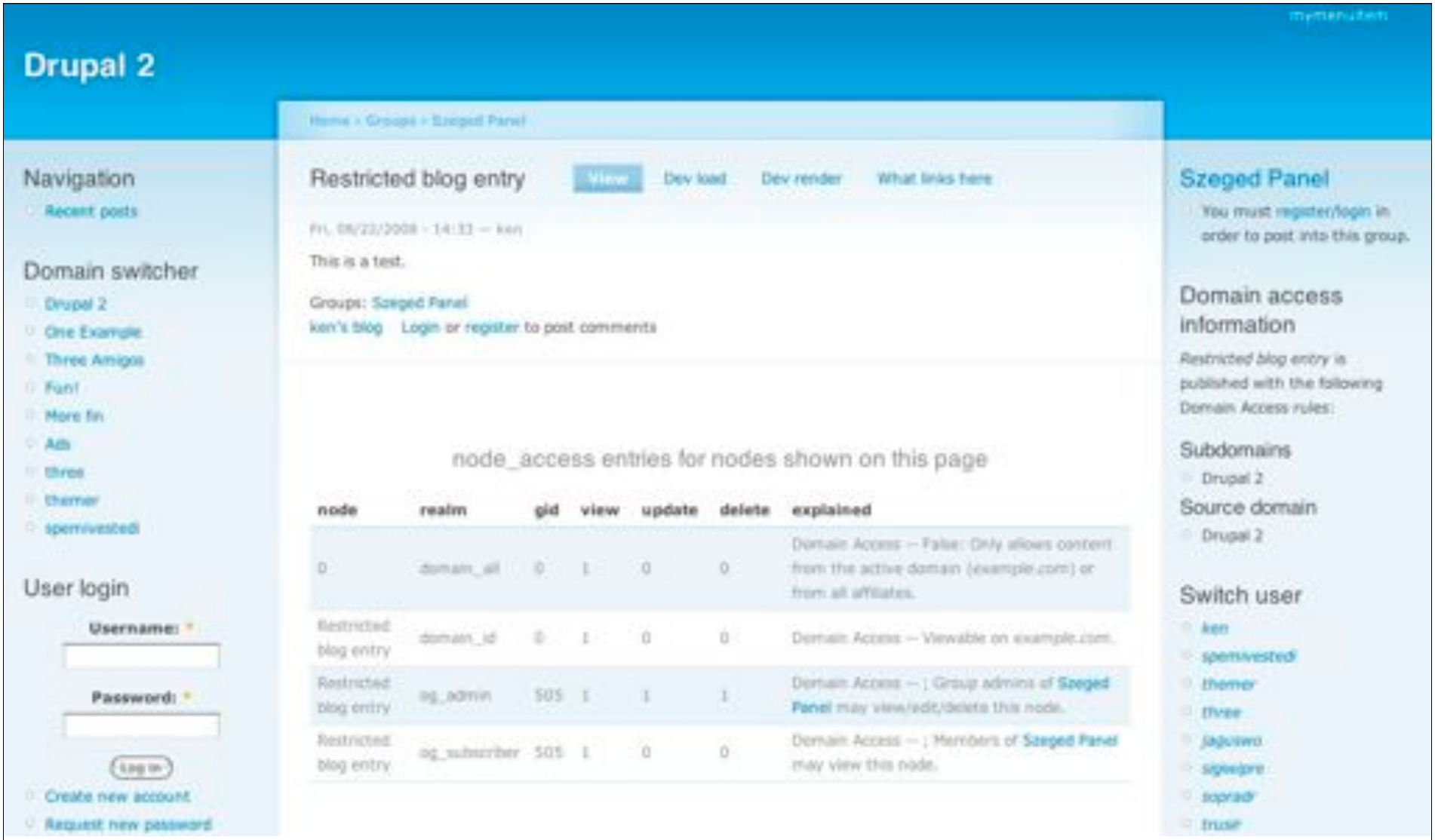
Site with Domain Access



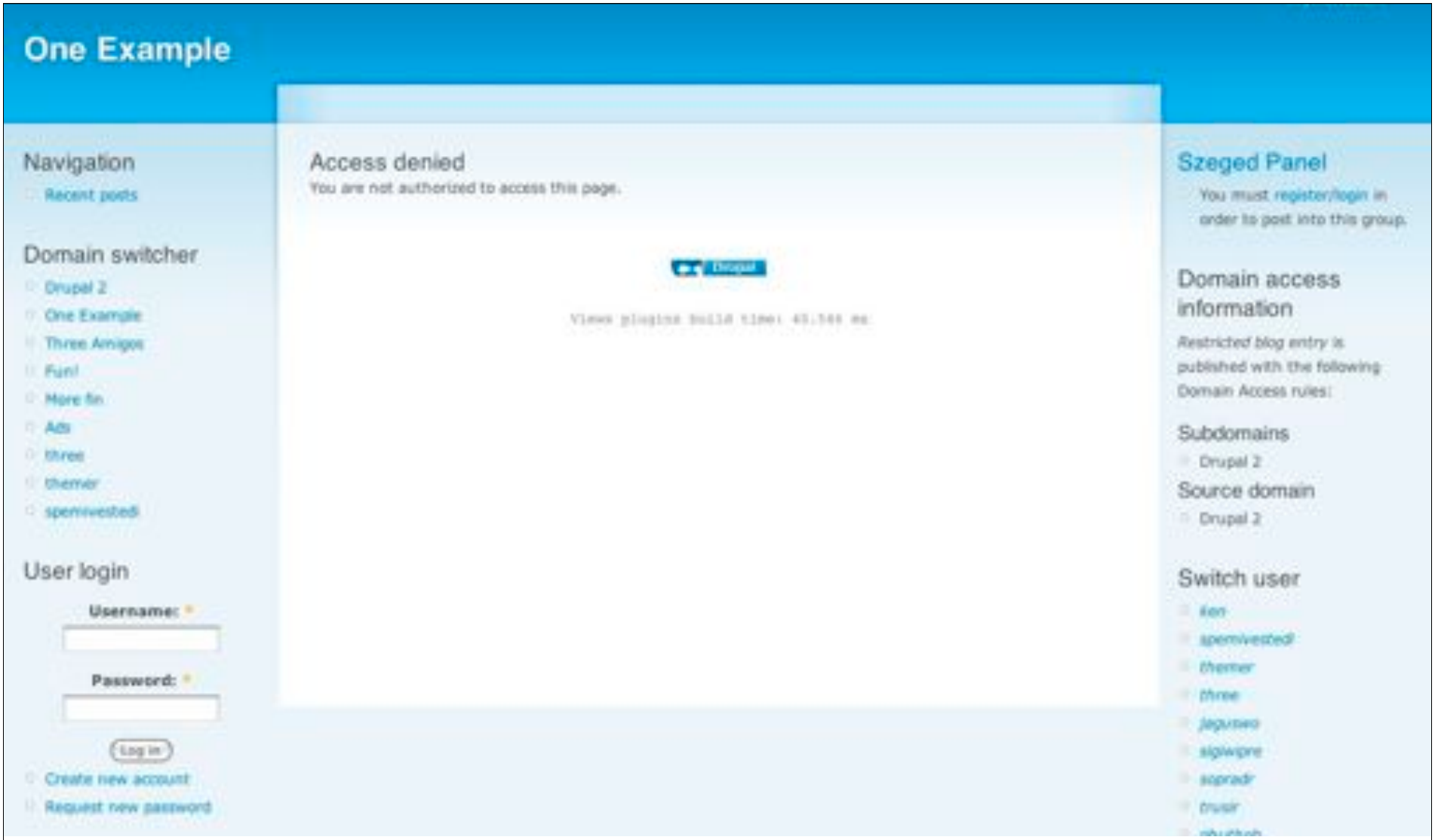
Domain Access with OG on an allowed domain



DA and OG with private node
on invalid domain



Access allowed by Domain Access



Both modules deny access

None shall pass

How does Node Access work?

- Define security permissions.
- Define blanket permissions.
- Define node module permissions.
- Define node access module permissions.
- Return TRUE or FALSE.

```
function node_access($op, $node, $account = NULL) {
  global $user;

  if (!$node) {
    return FALSE;
  }
  // Convert the node to an object if necessary:
  if ($op != 'create') {
    $node = (object)$node;
  }
  // If no user object is supplied, the access check is for the current user.
  if (empty($account)) {
    $account = $user;
  }
  // If the node is in a restricted format, disallow editing.
  if ($op == 'update' && !filter_access($node->format)) {
    return FALSE;
  }

  if (user_access('administer nodes', $account)) {
    return TRUE;
  }

  if (!user_access('access content', $account)) {
    return FALSE;
  }

  // Can't use node_invoke(), because the access hook takes the $op parameter
  // before the $node parameter.
  $module = node_get_types('module', $node);
  if ($module == 'node') {
    $module = 'node_content'; // Avoid function name collisions.
  }
  $access = module_invoke($module, 'access', $op, $node, $account);
  if (!is_null($access)) {
    return $access;
  }

  // If the module did not override the access rights, use those set in the
  // node_access table.
  if ($op != 'create' && $node->nid && $node->status) {
    $grants = array();
    foreach (node_access_grants($op, $account) as $realm => $gids) {
      foreach ($gids as $gid) {
        $grants[] = "(gid = $gid AND realm = '$realm')";
      }
    }

    $grants_sql = '';
    if (count($grants)) {
      $grants_sql = 'AND (' . implode(' OR ', $grants) .')';
    }

    $sql = "SELECT COUNT(*) FROM {node_access} WHERE (nid = 0 OR nid = %d) $grants_sql AND gran
    $result = db_query($sql, $node->nid);
    return (db_result($result));
  }

  // Let authors view their own nodes.
  if ($op == 'view' && $account->uid == $node->uid && $account->uid != 0) {
    return TRUE;
  }

  return FALSE;
}
```

Security and global checks

```
function node_access($op, $node, $account = NULL) {
  global $user;

  if (!$node) {
    return FALSE;
  }
  // Convert the node to an object if necessary:
  if ($op != 'create') {
    $node = (object)$node;
  }
  // If no user object is supplied, the access check is for the current user.
  if (empty($account)) {
    $account = $user;
  }
  // If the node is in a restricted format, disallow editing.
  if ($op == 'update' && !filter_access($node->format)) {
    return FALSE;
  }

  if (user_access('administer nodes', $account)) {
    return TRUE;
  }

  if (!user_access('access content', $account)) {
    return FALSE;
  }
```

Specific node module checks

```
// Can't use node_invoke(), because the access hook takes the $op parameter
// before the $node parameter.
$module = node_get_types('module', $node);
if ($module == 'node') {
  $module = 'node_content'; // Avoid function name collisions.
}
$access = module_invoke($module, 'access', $op, $node, $account);
if (!is_null($access)) {
  return $access;
}
```

```
function blog_access($op, $node, $account) {
  switch ($op) {
    case 'create':
      // Anonymous users cannot post even if they have the permission.
      return user_access('create blog entries', $account) && $account->uid ?
    case 'update':
      return user_access('edit any blog entry', $account) || (user_access('e
    case 'delete':
      return user_access('delete any blog entry', $account) || (user_access(
  }
}
```

Node Access checks

```
// If the module did not override the access rights, use those set in the
// node_access table.
if ($op != 'create' && $node->nid && $node->status) {
  $grants = array();
  foreach (node_access_grants($op, $account) as $realm => $gids) {
    foreach ($gids as $gid) {
      $grants[] = "(gid = $gid AND realm = '$realm')";
    }
  }

  $grants_sql = '';
  if (count($grants)) {
    $grants_sql = 'AND (. implode(' OR ', $grants) .')';
  }

  $sql = "SELECT COUNT(*) FROM {node_access} WHERE (nid = 0 OR nid = %d) $grants_sql
  $result = db_query($sql, $node->nid);
  return (db_result($result));
}

// Let authors view their own nodes.
if ($op == 'view' && $account->uid == $node->uid && $account->uid != 0) {
  return TRUE;
}

return FALSE;
```

Come see the violence
inherent in the system!

All node access systems are not created equal: 1

- Node Access modules cannot grant ‘create’ privileges.

```
// If the module did not override the access rights, use those set in the
// node_access table.
if ($op != 'create' && $node->nid && $node->status) {
  $grants = array();
  foreach (node_access_grants($op, $account) as $realm => $gids) {
    foreach ($gids as $gid) {
      $grants[] = "(gid = $gid AND realm = '$realm')";
    }
  }
```

- *These are restricted to node modules and hook_perm.*

All node access systems are not created equal: 2

- Node Access modules cannot act on unpublished nodes.

```
// If the module did not override the access rights, use those set in the
// node_access table.
if ($op != 'create' && $node->nid && $node->status) {
  $grants = array();
  foreach (node_access_grants($op, $account) as $realm => $gids) {
    foreach ($gids as $gid) {
      $grants[] = "(gid = $gid AND realm = '$realm')";
    }
  }
```

- *These are restricted to administrators and super-users.*

All node access systems are not created equal: 3

- The {node_access} table is not designed for CRUD.

Field	Type	Collation	Attributes	Null	Default
nid	int(10)		UNSIGNED	No	0
gid	int(10)		UNSIGNED	No	0
realm	varchar(255)	utf8_general_ci		No	
grant_view	tinyint(3)		UNSIGNED	No	0
grant_update	tinyint(3)		UNSIGNED	No	0
grant_delete	tinyint(3)		UNSIGNED	No	0

- *Design intent dictates database schema and enforces a limitation.*

All node access systems are not created equal: 4

- Multiple node grants can cancel each other out.

```
SELECT COUNT(*) FROM node_access WHERE nid = 0 AND ((realm = 'all' AND gid = 0) OR (realm = 'domain_site'
AND gid = 0)) AND grant_view >= 1
```

```
SELECT COUNT(*) FROM node n INNER JOIN node_access na ON na.nid = n.nid WHERE (na.grant_view >= 1 AND
((na.realm = 'all' AND na.gid = 0) OR (na.realm = 'domain_site' AND na.gid = 0)) ) AND ( n.promote = 1 AND
n.status = 1 )
```

```
SELECT DISTINCT(n.nid), n.sticky, n.created FROM node n INNER JOIN node_access na ON na.nid = n.nid WHERE
(na.grant_view >= 1 AND ((na.realm = 'all' AND na.gid = 0) OR (na.realm = 'domain_site' AND na.gid = 0)) ) AND (
n.promote = 1 AND n.status = 1 )ORDER BY n.sticky DESC, n.created DESC LIMIT 0, 10
```

All node access systems are not created equal: 5

- Node Access rules are collapsed by priority.

```
function node_access_acquire_grants($node) {
  $grants = module_invoke_all('node_access_records', $node);
  if (empty($grants)) {
    $grants[] = array('realm' => 'all', 'gid' => 0, 'grant_view' => 1,
  }
  else {
    // retain grants by highest priority
    $grant_by_priority = array();
    foreach ($grants as $g) {
      $grant_by_priority[intval($g['priority'])][] = $g;
    }
    krsort($grant_by_priority);
    $grants = array_shift($grant_by_priority);
  }

  node_access_write_grants($node, $grants);
}
```

Many (happy) returns

- Eight returns.
- Defaults to FALSE == good.
- Finding the conflicts in your code can be a burden.
- No hooks to alter other access grants.

```
function node_access($op, $node, $account = NULL) {
  global $user;

  if (!$node) {
    return FALSE;
  }
  // Convert the node to an object if necessary.
  if ($op != 'create') {
    $node = (object)$node;
  }
  // If no user object is supplied, the access check is for the current user.
  if (empty($account)) {
    $account = $user;
  }
  // If the node is in a restricted format, disallow editing.
  if ($op == 'update' && !filter_access($node->format)) {
    return FALSE;
  }

  if (user_access('administer nodes', $account)) {
    return TRUE;
  }

  if (!user_access('access content', $account)) {
    return FALSE;
  }

  // Can't use node_invoke(), because the access hook takes the $op parameter
  // before the $node parameter.
  $module = node_get_types('module', $node);
  if ($module == 'node') {
    $module = 'node_content'; // Avoid function name collisions.
  }
  $access = module_invoke($module, 'access', $op, $node, $account);
  if (!is_null($access)) {
    return $access;
  }

  // If the module did not override the access rights, use those set in the
  // node_access table.
  if ($op != 'create' && $node->nid && $node->status) {
    $grants = array();
    foreach (node_access_grants($op, $account) as $realm => $gids) {
      foreach ($gids as $gid) {
        $grants[] = "(gid = $gid AND realm = '$realm')";
      }
    }

    $grants_sql = '';
    if (count($grants)) {
      $grants_sql = 'AND (' . implode(' OR ', $grants) .')';
    }

    $sql = "SELECT COUNT(*) FROM {node_access} WHERE (nid = 0 OR nid = %d) $grants_sql AND gran
    $result = db_query($sql, $node->nid);
    return (db_result($result));
  }

  // Let authors view their own nodes.
  if ($op == 'view' && $account->uid == $node->uid && $account->uid != 0) {
    return TRUE;
  }

  return FALSE;
}
```

hook_access()

Node modules should not restrict ‘view’

Module	create	view	update	delete
blog	x		x	x
forum	x		x	x
node	x		x	x
poll	x		x	x
project	x	x	x	x
image	x		x	x

Making it work

- Crucial concepts
- Realms
- Grant Id [GID]
- grant_view
- grant_update
- grant_delete

{node_access} defaults

- The default row in the table must be present unless other node access modules are in use.

nid	gid	realm	grant_view	grant_update	grant_delete
0	0	all	1	0	0

- Otherwise the queries all return null.

```
SELECT COUNT(*) FROM node_access WHERE nid = 0 AND ((gid = 0 AND realm = 'all')) AND grant_view >= 1
SELECT COUNT(*) FROM node n WHERE n.promote = 1 AND n.status = 1
SELECT n.nid, n.sticky, n.created FROM node n WHERE n.promote = 1 AND n.status = 1 ORDER BY n.sticky DESC, n.created DESC LIMIT 0, 10
```

hook_node_access_records()

- Defines the rules that are saved to the {node_access} table. This routine is run just after node_save().

```
function hook_node_access_records($node) {
  if (node_access_example_disabling()) {
    return;
  }

  // We only care about the node if it's been marked private. If not, it is
  // treated just like any other node and we completely ignore it.
  if ($node->private) {
    $grants = array();
    $grants[] = array(
      'realm' => 'example',
      'gid' => TRUE,
      'grant_view' => TRUE,
      'grant_update' => FALSE,
      'grant_delete' => FALSE,
      'priority' => 0,
    );
    return $grants;
  }
}
```

What to return for each record

- Positional (not keyed) array, containing:
- ‘realm’ --> A unique name for your grant. Multiple realms are allowed.
- ‘gid’ --> A numeric identifier for the grant, indicating the context.
- ‘grant_view’ --> TRUE or FALSE that users can view the node.
- ‘grant_update’ --> TRUE or FALSE that users can edit the node.
- ‘grant_delete’ --> TRUE or FALSE that users can delete the node.
  - *‘priority’ declarations are frowned upon, as they disable other modules.*

Writing to {node_access}

- Never write directly to {node_access} when saving a node. Let the API handle it for you.

nid	gid	realm	grant_view	grant_update	grant_delete
0	0	domain_all	1	0	0
1	0	domain_site	1	0	0
1	0	domain_id	1	0	0
2	0	domain_site	1	0	0
2	0	domain_id	1	0	0
3	0	domain_site	1	0	0
3	0	domain_id	1	0	0
4	0	domain_site	1	0	0
4	0	domain_id	1	0	0

- You might need to insert default data here, but only in special cases.

Challenges to overcome

Storing your records

- node_access_rebuild() will empty and rebuild {node_access}.

```
function node_access_rebuild($batch_mode = FALSE) {
  db_query("DELETE FROM {node_access}");
  // Only recalculate if the site is using a node_access module.
  if (count(module_implements('node_grants'))) {
    if ($batch_mode) {
      $batch = array(
        'title' => t('Rebuilding content access permissions'),
        'operations' => array(
          array('_node_access_rebuild_batch_operation', array()),
        ),
        'finished' => '_node_access_rebuild_batch_finished'
      );
      batch_set($batch);
    }
```

- Be prepared!

Module access records

- Store your data in a safe place -- your own table.

```
$schema['domain_access'] = array(
  'fields' => array(
    'nid' => array('type' => 'int', 'unsigned' => TRUE, 'not null' => TRUE, 'default' => 0),
    'gid' => array('type' => 'int', 'unsigned' => TRUE, 'not null' => TRUE, 'default' => 0),
    'realm' => array('type' => 'varchar', 'length' => '255', 'not null' => TRUE, 'default' => ''')),
  'primary key' => array('nid', 'gid', 'realm'),
  'indexes' => array(
    'nid' => array('nid')),
);
```

- Store whatever data you need to rebuild your grants in the {node_access} table.

Declaring node grants

hook_node_grants()

- Determines the access rights for an individual user. These values are used to write the {node_access} SQL statement.

```
function hook_node_grants($account, $op) {
  if (user_access('access private content', $account)) {
    $grants['example'] = array(1);
  }
  $grants['example_owner'] = array($user->uid);
  return $grants;
}
```

- $op may be view, update or delete.

- *Your return value may vary based on the $op.*

What to return for each grant

- An associative (keyed) array of grants, where the realm is the key and the value is an array of grant ids.
- ‘realm’ --> A unique name for your grant. Multiple realms are allowed.
- ‘gid’ --> A numeric identifier for the grant, indicating the context.
- $grants[‘my_grant’] = array(1, 2, 3);

  -or-

  $grants[‘user_grant’][] = 10;

  $grants[‘user_grant’][] = 20;

How grants are applied

- When a page is requested, the $grants array is transformed into a JOIN query from the {node} to {node_access} table.

```
Array
(
    [domain_site] => Array
        (
            [0] => 0
        )

    [domain_id] => Array
        (
            [0] => 16
        )

)
```

The system in action

Query #1: Should we bother?

- If a NULL count is returned, access is denied.

node_access_view_all_nodes()

```
SELECT COUNT(*) FROM node_access
   WHERE nid = 0
      AND (
        (realm = 'all' AND gid = 0)
        OR (realm = 'domain_site' AND gid = 0)
        OR (realm = 'domain_id' AND gid = 16)
      )
  AND grant_view >= 1;
```

Query #2: Count the pages

- Send a pager_query() to count the output.

```
pager_query()

SELECT COUNT(*) FROM node n
    INNER JOIN node_access na
    ON na.nid = n.nid WHERE
    (na.grant_view >= 1
        AND ((na.realm = 'all' AND na.gid = 0)
        OR (na.realm = 'domain_site' AND na.gid = 0)
        OR (na.realm = 'domain_id' AND na.gid = 16)))
    AND ( n.promote = 1 AND n.status = 1 );
```

Query #3: Build the pages

- Send a pager_query() to build the output.

pager_query()

```
SELECT DISTINCT(n.nid), n.sticky, n.created
FROM node n INNER JOIN node_access na
ON na.nid = n.nid WHERE (na.grant_view >= 1
    AND ((na.realm = 'all' AND na.gid = 0)
        OR (na.realm = 'domain_site' AND na.gid = 0)
        OR (na.realm = 'domain_id' AND na.gid = 16)))
    AND ( n.promote = 1 AND n.status = 1 )
    ORDER BY n.sticky DESC, n.created DESC LIMIT 0,
    10
```

Tips from the wizard

The default grant

- Notice that the default grant is always checked.

```
SELECT COUNT(*) FROM node_access WHERE nid = 0 AND ((realm = 'all' AND gid = 0) OR (realm = 'domain_site'
AND gid = 0)) AND grant_view >= 1
SELECT COUNT(*) FROM node n INNER JOIN node_access na ON na.nid = n.nid WHERE (na.grant_view >= 1 AND
( na.realm = 'all' AND na.gid = 0) OR (na.realm = 'domain_site' AND na.gid = 0)) ) AND ( n.promote = 1 AND
n.status = 1 )
SELECT DISTINCT(n.nid), n.sticky, n.created FROM node n INNER JOIN node_access na ON na.nid = n.nid WHERE
(na.grant_view >= 1 AND ( na.realm = 'all' AND na.gid = 0) OR (na.realm = 'domain_site' AND na.gid = 0)) ) AND (
n.promote = 1 AND n.status = 1 )ORDER BY n.sticky DESC, n.created DESC LIMIT 0, 10
```

- This is why node_access_rebuild() removes it if other node access modules are present.

Troubleshooting

- If no node access modules, check for ‘row zero’ in {node_access}

nid	gid	realm	grant_view	grant_update	grant_delete
0	0	all	1	0	0

- If multiple node access grants (or modules), check for conflicts.

```
SELECT COUNT(*) FROM node_access WHERE nid = 0 AND ((realm = 'all' AND gid = 0) OR (realm = 'domain_site'
AND gid = 0) OR (realm = 'domain_id' AND gid = 16) OR (realm = 'og_user' AND gid = 2)) AND grant_view >= 1
```

- Remember the -OR- factor.

Developer tools: Devel Node Access

node_access entries for nodes shown on this page

node	realm	gid	view	update	delete	explained
0	domain_all	0	1	0	0	Domain Access -- False: Only allows content from the active domain (*ken.example.com*) or from all affiliates.
Cui	domain_id	0	1	0	0	Domain Access -- Viewable on *example.com*.
Cui	domain_site	0	1	0	0	Domain Access -- Viewable on all affiliate sites.
Paratus Lucidus Vel Eum Vulputate Amet	domain_id	0	1	0	0	Domain Access -- Viewable on *example.com*.

Developer tools: hook_node_access_explain()

- Tell people what your module does in everyday language!

```
/**
 * Implements hook_node_access_explain for devel.module
 */
function domain_node_access_explain($row) {
  global $_domain;
  $active = $_domain['subdomain'];
  $domain = domain_lookup($row->gid);
  $return = t('Domain Access -- ');
  switch ($row->realm) {
    case 'domain_all':
      if (domain_grant_all() == TRUE) {
        $return .= t('True: Allows content from all domains to be shown.');
      }
      else {
        $return .= t('False: Only allows content from the active domain (%domain) or from all affiliates.', a
      }
      break;
    case 'domain_site':
      $return .= t('Viewable on all affiliate sites.');
      break;
    case 'domain_id':
      $return .= t('Viewable on %domain.', array('%domain' => $domain['subdomain']));
      break;
```

Developer tools: build a debugger

Debugging status: *

- ○ Do not show debugging output
- ◉ Show debugging output on node view

If set, users with the *set domain access* permission will be able to view the node access rules for each node. See the README for more details.

Ibidem Luptatum Vel Ille Letalis Interdico

Fri, 03/28/2008 - 20:47 — mubravitasw

node (blog) - Fere refoveo commodo turpis. Nutus vereor abico tamen iriure. Macto quadrum te. Eum nobis refero cui.Voco dolor veniam esse uxor acsi abluo voco premo. Tation genitus letalis.

Subdomains

- ○ Drupal 2
- ○ All affiliates

Source domain: *Drupal 2*

mubravitasw's blog gichuwrawori kado chutheslovop kethikucli swehoba

Help us build a better system

- Saturday at 13:30
- Cisco BOF room

Core node access API - next steps

Submitted by weitzman on Thu, 07/17/2008 - 01:06.

12 votes

add vote

Co-presenters:

agentrickard

Session time:

08/30/2008 - 13:30 - 08/30/2008 - 14:30

Overview

Lets brainstorm about what improvements we can make to the node access control system.

Agenda

* How to make it easier to grok.
* What features should be there but aren't

Goals

Close with a sentence or two describing the outcome you'd like from this session. For example, is the goal to define a problem and come up with a solution? If you're imparting knowledge, what sort of knowledge should attendees hope to gain by the end?

And there was much rejoicing!