

A Field Analysis of Relational Database Schemas in Open-source Software (Extended)

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Abstract—The relational schemas of 512 open-source projects storing their data in MySQL or PostgreSQL databases are investigated by querying the standard *information schema*, looking for various issues. These SQL queries are released as the *Salix* free software. As it is fully relational and relies on standards, it may be installed in any compliant database to help improve schemas. The overall quality of the surveyed schemas is poor: a majority of projects have at least one table without any primary key or unique constraint to identify a tuple; data security features such as referential integrity or transactional back-ends are hardly used; projects that advertise supporting both databases often have missing tables or attributes. PostgreSQL projects have a better quality compared to MySQL projects, and it is even better for projects with PostgreSQL-only support. However, the difference between both databases is mostly due to MySQL-specific issues. An overall predictor of bad database quality is that a project chooses MySQL or PHP, while good design is found with PostgreSQL and Java. The few declared constraints allow to detect latent bugs, that are worth fixing; more declarations would certainly help unveil more bugs. Our survey also suggests some features of MySQL and PostgreSQL as particularly error-prone. This first survey on the quality of relational schemas in open-source software provides a unique insight in the data engineering practice of these projects.

Keywords—open-source software; database quality survey; automatic schema analysis; relational model; SQL.

I. INTRODUCTION

This is an extended version of a paper [1] presented at DBKDA'2011. The bibliography is much more thorough. 512 schemas are surveyed instead of 407 (+25%). Comments have been updated accordingly. More detailed tables are provided about the results. Appendices describe all the advices available with our schema analyzer, and provide the full list of projects surveyed and their grading.

In the beginning of the computer age, software was freely available, and money was derived from hardware only [2]. Then in the 70s it was *unbundled* and sold separately in closed proprietary form. Stallman initiated the free software movement, in 1983 with the *GNU Project* [3], and later the *Free Software Foundation* [4], which is now quite large [5][6] and expanding [7] (Predicts 2010) to implement his principle of sharing software. Such free software is distributed under a variety of licenses [8] which discuss copyright and liability. The common ground is that it must be available as source code to allow its study, change and improvement as opposed to compiled or obfuscated, hence the expression *open source* [9][10][11]. This induces many technical, economical,

legal, and philosophical issues. Open-source software (OSS) is a subject of academic studies [12] in psychology, sociology, economics, or software engineering, including quantitative surveys. Developers' motivation [13][14][15][16][17] organization [18][19][20][21][22][23][24][25], profiles [26][27] are investigated and user communities [28]; Existing economic frameworks [29] are used to analyze the phenomenon, as well as the influence of public policies [30]. Research focussing on software engineering issues can also be found. The development of the Apache web server popular [31] is compared to non-OSS projects [32] and its user assistance is analyzed [33]. Quantitative studies exist about code quality in OSS [34][35][36][37][38] and its dual, static analysis to uncover bugs [39][40]. Database surveys are available about market shares [41], or server exposure security issues [42]. This study is the first survey on the quality of relational database schemas in OSS. It provides a unique insight in the data engineering practice of these projects.

Codd's relational model [43] is an extension of the set theory to relations (tables) with attributes (columns) in which tuple elements are stored (rows). Elements are identified by keys, which can be used by tuples to reference one another between relations. The relational model is sound, as all questions (in the model) have corresponding practical answers and *vice versa*: the tuple relational calculus describes questions, and the mathematically equivalent relational algebra provides their answers. It is efficiently implemented by many commercial and open-source software such as Oracle, DB2 or SQLite. The *Structured Query Language* (SQL [44]) is available with most relational database systems, although the detailed syntax often differs. The standardization effort also includes the *information schema* [45], which provides meta data about the schemas of databases through relations.

The underlying assumption of our study is that applications store precious transactional user data, thus should be kept consistent, non redundant, and easy to understand. We think that database features such as key declarations, referential integrity and transaction support help achieve these goals. In order to evaluate the use of database features in open-source software, and to detect possible design or implementation errors, we have developed a tool to analyze automatically the database structure of an application by querying its *information schema* and generating a report, and we have applied it to 512 open-source projects. Following MacCabe's metric to measure program complexities [46][47][48], several metrics

address data models [49][50] or database schemata either in the relational [51][52] or object relational [53] models, including experimental validations [54]. These metrics rely on information not necessarily available from the database concrete schemas. We have rather followed the dual and pragmatic approach [55], which is not to try to do an absolute and definite measure of the schema, but rather to uncover issues based on static analyses. Thus the measure is relative to the analyses performed and results change when more are added.

Section II presents the methodology used in this study. We describe our tool, our grading strategy and the statistical validation used on the assertions derived from our analyses. Section III lists the projects by category and technology, and discusses similarities and differences depending on whether they run on MySQL or PostgreSQL. Section IV describes the results of our survey. The overall quality of projects is quite poor, as very few database schemas do not raise error-rated advices. Section V gives our conclusive thoughts.

II. METHODOLOGY

Our *Salix* automatic analyzer is based on the *information schema*. We discuss the queries, then describe the available advices, before presenting the statistical validation used.

A. Information schema queries

Our analyses are performed automatically by SQL queries on the databases meta data using the standard *information schema*. This relational schema stores information about the databases structure, including catalogs, schemas, tables, attributes, types, constraints, roles, permissions... The set of SQL queries used for this study are released as the *Salix* free software. It is based on `pg-advisor` [56], a PostgreSQL-specific proof of concept prototype developed in 2004. Some checks are inspired by Currier [57], Baron [58] and Berkus [59] or similar to Boehm [60]. Our tool creates a specific table for every advice by querying the *information schema*, and then aggregates the results in summary tables in a dedicated schema. It is fully relational in its conception [61]: there is no programming other than SQL queries, but a small shell driver which allows to *create* the advices, to *show* or *report* them in some detail to the interested user, and finally to *drop* them out of the database. The development of *Salix* uncovered multiple issues with both implementations of the *information schema*.

B. Advice classification and project grading

The 47 issues derived by our SQL queries on the standard *information schema* are named *advices*, as the user is free to ignore them. Although the performed checks are basic and syntactic, we think that they reflect the quality of the schemas. A detailed list of advices currently implemented in our tool is provided in the Appendix. Each advice has a category (19 design, 13 style, 6 consistency, 4 version, 5 system), a severity (7 errors, 21 warnings, 14 notices, 5 informations), and a level (1 raised per database, 10 per schema, 27 per relation, 7 per

attribute, 2 per role). The severity classification is arbitrary and must be evaluated critically by the recipient: most of them should be dealt with, but in some cases they may be justifiable. Moreover, detected errors do not imply that the application is not functional.

The 19 **design** advices focus on detecting design errors. Obviously, semantic error, say an attribute is in the wrong relation, cannot be guessed without understanding the application and thus are out of reach of our automatic analysis. We rather focus on primary and foreign key declarations, or warn if they are missing. The rate of non-null attributes is also checked, with the underlying assumption from our experience that most data are mandatory in a relation. We also check the number of attributes so as to detect a possible insufficient conception effort.

The 13 **style** advices focus on relation and attribute names. Whether a name is significant in the context cannot be checked, so we simply look at their length. Short names are discouraged as they would rather be used as aliases in queries, with the exception of `id` and `pk`. We also check that the same name does not represent differently typed data, to avoid confusing the user.

The 6 **consistency** advices checks for type and schema consistency in a project, such as type mismatches between a foreign key and the referenced key. As databases may also implements some of these checks, it is possible that some cases cannot arise.

The 4 **version** advices focus on database-specific checks, such as capabilities and transaction support, as well as homogeneous choices of back-end engines in a project. This category could also check the actual version of a database used looking for known bugs or obsolescence. Only MySQL-specific version advices are currently implemented.

Finally, the 5 **system** advices, some of which PostgreSQL-specific, check for weak passwords, and key and index issues.

These advices aim at helping the schema developer to improve its relational design. We also use them in our survey to grade projects with a mark from 0 to 10, by removing points each time an advice is raised, taking more points if the severity is high. The grading process is normalized using the number of possible occurrences, so that larger projects do not receive lower marks just because of the likelihood of having more issues for their size. Also, points are not removed twice for the same issue: for instance, if a project does not have a single foreign key, the same issue will not be raised again on every tables. Advices not relevant to our open-source database schema survey, *e.g.*, weak password checks, were deactivated.

C. Survey statistical validation

The data collected suggest the influence of some parameters on others. These results deal with general facts about the projects (say foreign keys are more often used with PostgreSQL) or about their grading (say MySQL projects get lower marks). In order to determine significant influences, we applied Pearson's chi-square tests [62] to compute probabilistic degrees of certainty. Each checked assertion is labeled with an expression indicating the degree of certainty of the influence of one parameter on another:

very sure The probability is 1% or less to get a result as or more remote from the average. Thus we conclude that there is an influence, with a very high degree of certainty.

rather sure The probability of getting such a result is between 1% and 5% (the usual statistical threshold). Thus there is an influence, with a high degree of certainty.

marginally sure The probability is between 5% and 25%. Such a result may have been obtained even if there is no influence. The statement must be taken with a pinch of salt.

not sure The probability is over 25%, or there is not enough available data to compute it. The test cannot assert that there is a significant influence.

The rationale for choosing Pearson's chi-square test is that it does not make any assumption about the distribution of values. However, it is crude, and possibly interesting and somehow true results may not be validated. Moreover, the test requires a minimal population, which is not easily reached on our small data set especially when criteria are crossed. Finally, it needs to define distinct populations: for grades or sizes, these populations are cut at the median value in order to perform the test on balanced partitions.

We also computed a correlation matrix to look for possible inter-parameter influence. The result suggested that the parameters are pretty independent beyond the obvious links (say the use of a non-transactional back-end is correlated with isolated tables), and did not help uncover significant new facts.

III. PROJECTS

We discuss the projects considered in this study, grouped by categories, technologies, sizes and release dates. We first present how projects were selected, and then an overview.

A. Project selection

We have downloaded 512 open-source projects starting in the first semester of 2008, adding to our comparison about every project that uses either MySQL [63] or PostgreSQL [64] that we could find and install with reasonable time and effort. The database schemas included in this study are derived from a dump of the database after installation, or from the creation statements when found in the sources. These projects were discovered from various sources: lists and comparisons of software on Wikipedia (Software lists about: photo galleries, content management systems, internet forums, reference management, issue tracking systems, wikis, social networking, church management, student information systems, accounting, weblog, internet relay chat, healthcare, genealogy...) and other sites; package dependencies from Linux distributions such as Debian [65] or Ubuntu [66] requiring databases; security advisories mentioning SQL [67]; searches on SourceForge [68] which use SQL databases.

Some projects were fixed manually because of various issues, such as: the handling of double-dash comments by MySQL, attribute names (e.g., out) rejected by MySQL, bad foreign key declarations or other incompatibilities detected when the projects were forced to use the InnoDB back-end instead of MyISAM, or even some PostgreSQL table definitions including a MySQL specific syntax that were clearly

never tested. A particular pitfall of PostgreSQL is that by default syntax errors in statements from an SQL script are ignored and the interpreter simply jumps to the next statement. When installing a project, the flow of warnings often hides these errors. Turning off this feature requires modifying the script, as no command option disables it. More than a dozen PostgreSQL projects contained this kind of issues, which resulted in missing tables or ignored constraint declarations.

B. Overview of projects

We have studied the relational schemas of 512 (see [69] for the full list) open-source projects based on databases: 482 of these run with MySQL, 126 with PostgreSQL, including 96 on both. A project supporting PostgreSQL is very likely to support also MySQL (76%), although the reverse is not true (only 19%) (*very sure*), outlining the relative popularity of these tools. Only 30 projects are PostgreSQL specific. Although there is no deliberate bias in the selection process described in the previous section, where we aimed at completeness, some implicit bias remains nevertheless: for instance, as we can speak mostly English and French, we found mostly international projects advertised in these tongues; Table I shows main project categories, from the personal mundane (game, homepage) to the professional serious (health-care, accounting, system). Table II shows the same for project technologies. Projects in rare categories or using rare technologies do not appear in these cut-off tables. The result is heavily slanted towards PHP web applications (77%), which seems to reflect the current trend of open-source programming as far as the number of projects is concerned, without indication of popularity or quality. The ratio of PHP projects increases from PostgreSQL only support (26%) to both database support (58%) (*very sure*) to MySQL only support (86%) (*very sure*): PHP users tend to choose specifically MySQL.

The survey covers 18993 tables (MySQL 13494, PostgreSQL 5499) containing 166906 attributes (MySQL 114561, PostgreSQL 52345). The project sizes in tables average at 31.2, median 16 (from 1 to 607 tables), with 2 to 10979 attributes. MySQL projects average at 28 tables, median 15 (from 1 to 466), with 238 attributes (from 2 to 9725), while PostgreSQL projects average 44 tables, median 18 (from 1 to 607), with 415 attributes (from 5 to 10979 attributes). The largest MySQL project is OSCARMCMASTER, and the largest PostgreSQL project is ADEMPIERE. Detailed table counts raise from projects with MySQL only support (average 26.4, median 15), to both databases (average 34.0, median 17) or PostgreSQL only (average 75.5, median 30.5). MySQL-only projects are smaller than other projects (*marginally sure*): more ambitious projects seem to use feature-full but maybe less easy to administrate PostgreSQL. However obvious this assertion would seem, the statistical validation is weak because of the small number of projects with PostgreSQL. MySQL projects that use the InnoDB back-end are much larger than their MyISAM counterpart (*very sure*) and are comparable to projects based on PostgreSQL, with 53 tables on average. The number of attributes per table is comparable although smaller for MySQL (average 8.5 – median 7.0) with respect to PostgreSQL (average 9.5 – median 6.0).

Category	Total	%	My	%	Pg	%	both	%	tabs	atts
CMS	83	16.2	71	18.4	1	3.3	11	11.5	36.6	6.6
System	48	9.4	26	6.7	1	3.3	21	21.9	25.2	10.9
Project	28	5.5	15	3.9	5	16.7	8	8.3	25.4	6.9
Blog	27	5.3	22	5.7	0	0.0	5	5.2	26.8	6.9
Market	22	4.3	21	5.4	0	0.0	1	1.0	53.0	7.6
Forum	19	3.7	17	4.4	0	0.0	2	2.1	23.1	8.3
Accounting	18	3.5	11	2.8	6	20.0	1	1.0	87.8	8.8
Game	16	3.1	16	4.1	0	0.0	0	0.0	26.4	6.6
Mail	16	3.1	8	2.1	1	3.3	7	7.3	10.1	5.4
IRC	13	2.5	6	1.6	1	3.3	6	6.3	14.3	6.8
Homepage	12	2.3	11	2.8	0	0.0	1	1.0	5.1	7.0
Healthcare	11	2.1	6	1.6	2	6.7	3	3.1	89.5	11.5
Phone	11	2.1	5	1.3	2	6.7	4	4.2	18.2	14.6
Address	10	2.0	10	2.6	0	0.0	0	0.0	7.7	7.7
Genealogy	10	2.0	8	2.1	1	3.3	1	1.0	16.4	8.4
Photo	10	2.0	9	2.3	0	0.0	1	1.0	20.2	7.1
Community	9	1.8	7	1.8	0	0.0	2	2.1	17.3	8.1
Music	9	1.8	8	2.1	1	3.3	0	0.0	16.7	5.0
P2P	9	1.8	8	2.1	0	0.0	1	1.0	11.9	7.0
Reference	9	1.8	8	2.1	0	0.0	1	1.0	15.8	11.7
Wiki	9	1.8	7	1.8	1	3.3	1	1.0	15.7	5.6

TABLE I
MAIN CATEGORIES OF PROJECTS, WITH COUNTS, DATABASE SUPPORT AND SIZES

Technology	Total	%	My	%	Pg	%	both	%	tabs	atts
PHP	399	77.9	335	86.8	8	26.7	56	58.3	29.3	7.4
C	38	7.4	12	3.1	5	16.7	21	21.9	21.3	11.5
Java	22	4.3	8	2.1	6	20.0	8	8.3	67.5	9.3
Perl	21	4.1	10	2.6	5	16.7	6	6.3	44.0	6.7
SQL	8	1.6	6	1.6	1	3.3	1	1.0	27.3	4.9
C++	7	1.4	5	1.3	1	3.3	1	1.0	11.4	15.3
Python	7	1.4	4	1.0	2	6.7	1	1.0	42.9	6.5
Ruby	7	1.4	4	1.0	2	6.7	1	1.0	49.5	7.4

TABLE II
MAIN TECHNOLOGIES OF PROJECTS, WITH COUNTS, DATABASE SUPPORT AND SIZES

The per-category tables (*tabs*) and attributes-per-table (*atts*) counts shows that *accounting*, *health-care* and *market* projects seem more ambitious than other categories (*marginally sure*). The per-technology analysis counts suggests that *Perl*, *Python* and *Java* projects are larger than those based on other technologies (*marginally sure*).

These projects are mostly recent, taking their status at an arbitrary common reference date chosen as March 31, 2009: 308 (60%) were updated in the last year, including 177 (34%) in the last six months, and the others are either obsolete or very stable. The rate of recent projects raises from MySQL-only projects (55%) to projects with both support (73%) (*very sure*) or with PostgreSQL support at (76%) (*very sure*). However there is no significant difference on the recent maintenance figure between projects that are PostgreSQL-only and projects with both databases support. Projects that include PostgreSQL support were updated more recently.

IV. SURVEY RESULTS

We now analyze the open-source projects of our survey by commenting actual results on MySQL and PostgreSQL, before comparing them. Table III summarizes the advices raised for MySQL and PostgreSQL applications. The first four columns give the advice title, level, category and severity. Then

four columns for each database list the results. The first two columns hold the number of projects (*i.e.* schema) tagged and the overall rate. The last two columns give the actual number of advices and rate, which varies depending on the level. A per-project aggregate is also available online [69].

A. Primary keys

A majority of MySQL projects (262 – 54%) have at least one table without neither a primary key nor a unique constraint, and this is even worse with PostgreSQL projects (76 – 60%). The certainty of the observation (*rather sure*) on MySQL-only vs PostgreSQL-only is low because of the small number of projects using the later. As 11% of all MySQL tables and 18% of all PostgreSQL tables do not have any key, the view of relations as sets is hindered as tuples are not identified, and data may be replicated without noticing.

A further analysis gives some more insight. For MySQL, 41% of tables without key do have some `KEY` option for indexes, but without the `UNIQUE` or `PRIMARY` keyword that makes it a key. Having `KEY` not always declaring a key was clearly a bad design choice. A little 5% of tables without key have an *auto increment* attribute, which suggest uniqueness in practice, but is not enforced. Also, the missing key declaration often seems to be composite. Some tables

Advice	Lvl.	Cat.	Sev.	MySQL				PostgreSQL			
				Proj	%	Adv	%	Proj	%	Adv	%
Schema without any FK	sch.	design	error	425	88	425	88	70	55	70	55
Tables without PK nor Unique	table	design	error	262	54	1521	11	76	60	1010	18
FK type mismatch	table	consist.	error	2	0	17	0	10	7	153	2
Backend engine inconsistency	sch.	version	error	30	6	30	6	0	0	0	0
FK length mismatch	table	consist.	error	4	0	6	0	2	1	10	0
Integer PK but no other key	table	design	warn	437	90	7470	55	106	84	2509	45
Homonymous heterogeneous attributes	att.	style	warn	296	61	2294	2	76	60	573	1
Unsafe backend engine used in schema	sch.	version	warn	433	89	433	89	0	0	0	0
Attribute count per table over 40	table	design	warn	98	20	220	1	25	19	91	1
Isolated Tables	table	design	warn	30	6	979	7	40	31	1300	23
Tables without PK but with Unique	table	design	warn	117	24	405	3	15	11	40	0
Unique nullable attributes	att.	design	warn	73	15	261	0	23	18	172	0
Nullable attribute rate over 80%	sch.	design	warn	34	7	34	7	25	19	25	19
Redundant indexes	table	system	warn	0	0	0	0	23	18	196	3
Large PK referenced by a FK	table	design	warn	10	2	118	0	19	15	216	3
Attribute name length too short	att.	style	warn	27	5	91	0	16	12	51	0
Table name length too short	table	style	warn	16	3	23	0	7	5	17	0
Composite Foreign Key	table	design	warn	5	1	19	0	8	6	26	0
FK not referencing a PK	table	design	warn	2	0	16	0	7	5	23	0
Redundant FK	table	system	warn	1	0	1	0	2	1	6	0
Non-integer Primary Key	table	design	note	268	55	2261	16	81	64	1729	31
MySQL is used	base	version	note	482	100	482	100	0	0	0	0
Attribute count per table over 20	table	design	note	230	47	684	5	60	47	421	7
Tables with Composite PK	table	design	note	196	40	1781	13	63	50	703	12
Attribute name length quite short	att.	style	note	201	41	748	0	49	38	244	0
Attribute named after its table	att.	style	note	139	28	3114	2	42	33	5033	9
Table without index	table	system	note	0	0	0	0	60	47	719	13
Nullable attribute rate in 50-80%	sch.	design	note	76	15	76	15	33	26	33	26
Table name length quite short	table	style	note	70	14	102	0	28	22	52	0
Table with a single attribute	table	design	note	74	15	419	3	26	20	91	1
Mixed attribute name styles	table	style	note	115	23	1007	7	1	0	37	0
Mixed table name styles	sch.	style	note	51	10	261	54	8	6	22	17
Attribute name length short	att.	style	info	326	67	2911	2	81	64	1047	2
Unsafe backend engine used on table	table	version	info	433	89	10423	77	0	0	0	0
Nullable attribute rate in 20-50%	sch.	design	info	137	28	137	28	41	32	41	32
Table name length short	table	style	info	136	28	258	1	38	30	81	1

TABLE III
LIST OF RAISED ADVICES AND DETAILED COUNTS ABOUT THE 512 PROJECTS

without key declarations are intended as one tuple only, say to check for the version of the schema or configuration of the application. Similarly, 28% of PostgreSQL tables without key have an index declared. Moreover, 22% have a `SERIAL` (auto incremented) attribute: Many designers seem to assume wrongly that `SERIAL` implies a key. A comment found in the `SQLGREY` project source suggests that some keys are not declared because of MySQL key size limits.

A simple integer primary key is provided on 61% of tables, with a significantly decreasing rate from MySQL-only (65%) to both database support (62%) (*rather sure*) down to PostgreSQL-only support (39%) (*very sure*). If these primary keys were non-semantic numbers to identify tuples, one would expect at least one other key declared on each table to identify the underlying semantic key. However it is not the case: most (85%) of these tables do not have any other key. When a non simple primary key is available, it is either based on another type or a composite key. The composite keys are hardly referenced, but as the foreign keys are rarely declared one cannot be sure, as shown in the next section.

B. Referential integrity

Foreign keys are important for ensuring the data consistency in a relational database. They are supported by PostgreSQL, and by MySQL but with some back-end engines only. In particular, the default MyISAM back-end does not support foreign keys, and this feature was deemed noxious in previous documentations: Version 3.23 includes a *Reasons NOT to Use Foreign Keys constraints* Section arguing that they are only useful to display diagrams, hard to implement and terrible for performance. Foreign key constraints are introduced with the InnoDB engine starting with *MySQL 3.23.44* in January 2001. Although the constraints are ignored by the default MyISAM engine, the syntax is parsed, and triggers the creation of indexes. Version 5.1 documentation has a *Foreign Keys* Section praising the feature, as it *offers benefits*, although it slows down the application. Caveats describe the inconsistencies that may result from *not* using transactions and referential integrity. From a pedagogical perspective, this is a progress.

Foreign key constraints have long been a missing or avoided feature in MySQL and this seems to have retained momentum in many projects, as it is not supported by the default engine:

few MySQL projects (57 – 11% of all projects, 72% of those with InnoDB) use foreign key constraints. The foreign key usage rate is higher (20%) when considering projects supporting both databases (*marginally sure*).

Among MySQL projects, 403 (83%) use only the default MyISAM back-end engine, thus do not have any foreign key checks enabled. In the remainder, 49 (10%) use only InnoDB, and 30 (6%) use a combination of both. More projects (21 – 21%) rely on InnoDB among those supporting both MySQL and PostgreSQL (*marginally sure*). A third of InnoDB projects (30 – 37%) are not consistent in their engine choice: 34% of tables use MyISAM among the 79 InnoDB projects. A legitimate reason for using MyISAM tables in an InnoDB project is that FULLTEXT indexes are only available with the former engine. However, this only applies to 11 tables in 6 projects, all other 1441 MyISAM tables in InnoDB projects are not justified by this argument. A project may decide to store transient data in an unsafe engine (*e.g.*, memory) for performance reason and possibly without any risk of losing data, but this optimization is beyond our tool and is reported as an error. This case is rare, as it represents only 15 tables in 8 projects. About 26% of tables use MyISAM as a default implicit choice in InnoDB projects, similar to 28% when considering all MySQL projects. Some engine inconsistencies seems due to forgotten declarations falling back to the default MyISAM engine.

We have forced the InnoDB back-end engine for all MySQL projects: 22 additional projects declare 92 new foreign key constraints previously ignored. These new foreign keys are very partial, targeting only some tables. They allow to uncover about two dozen issues, either because the foreign key declaration were failing (say from type errors detected by MySQL) or thanks to analyses from our tool. Additional checks based on foreign keys cannot be raised on schemas that do not declare any of them. Thus *isolated tables* warnings must be compared to the number of projects that do use referential constraints: 30 – 52% of these seem to have forgotten at least some foreign keys, and it is actually the case by checking some of these projects manually.

The foreign key usage is better with PostgreSQL projects, although it is still a minority (56 projects – 44%). This rate is close to the foreign key usage of MySQL projects when considering InnoDB projects only. It gives a better opportunity for additional advices to be checked. The foreign key usage rate raises significantly to 74% when considering PostgreSQL-only projects vs dual support projects (*very sure*).

On the very few projects with partial foreign key declarations, several of these declaration reveal latent bugs, including type mismatch, typically CHAR targeting a VARCHAR or vice-versa, or different integers, and type length mismatch, usually non matching VARCHAR sizes. There are 23 such bugs found out of the small 1979 declared MySQL attribute constraints, and 163 among the 4424 PostgreSQL constraints. The rate is greater for PgSQL, possibly helped by the use of SERIAL which may be considered as a primary key by developers without being declared as such. There are also 153 important warnings related to foreign keys raised for MySQL, and 265 for PostgreSQL. If this ratio of errors is projected on

a the number of tables involved, hundreds additional latent bugs could be detected if the developers were to declare the referential constraints.

C. Miscellaneous issues

More issues were found about style, attribute constraints and by comparing projects with dual database support.

There is 13669 noticeable style issues raised from our analyses (7640 for MySQL, 6029 for PostgreSQL), relating to table or attribute names, including a number of one-letter attribute names or two-letters table names. The *id* attribute name is used in the SLASH project with up to 6 different types, mixing various integers and fixed or variable length text types. In PHPETITION, a *date* attribute has types DATE, DATETIME or VARCHAR. 81% of MySQL projects and 78% of PostgreSQL have such style issues.

Many projects does not bother with NOT NULL attribute declarations: 110 MySQL projects (22%) and 58 PostgreSQL projects (46%) have over half of their attributes null-able. This does not reflect the overall use of constraints: for MySQL, the average number of key-related constraints per table is 1.07 (from BOARDPLUS 0.00 to JWHOISSERVER 3.57), while for PostgreSQL it is 1.24 (from ANDROMEDA 0.00 to ADEMPIERE 4.25). Project ANDROMEDA is astonishing: there is not a single constraint declared (no primary key, no foreign key, no unique, no not null) on the 180 tables, although there are a number of non-unique indexes and of sequences.

It is interesting to compare the schemas of the 96 projects available with both databases. This dual support must not be taken at face value: PostgreSQL support is often an afterthought and is not necessarily functional, including project such as ELGG, TAGADASH, QUICKTEAM or TIKIWIKI where some PostgreSQL table declarations use an incompatible MySQL syntax; 38 (39%) projects have missing tables or attributes between the MySQL and PostgreSQL versions: 398 tables and 191 individual attributes are missing or misspelled one side or another. Among the missing tables, 73 look like some kind of sequence, and thus might be possibly legitimate, although why the *auto increment* feature was not satisfactory is unclear. At the minimum, the functionalities are not the same between MySQL and PostgreSQL versions for those projects.

D. Overall quality

We have computed a synthetic project quality evaluation ranging from 10 (good) to 0 (bad) by removing points based on advice severity (error, warning, notice), level (schema, table, attribute) and project size. The MySQL projects quality average is 4.4 ± 1.4 (from 9.5 JWHOISSERVER to 0.0 MANTIS), significantly lower than PostgreSQL 5.4 ± 1.8 (from 9.4 COMICS to 0.0 NURPAWIKI) (*very sure*). This does not come as a surprise: most MySQL projects choose the default data-unsafe MyISAM engine, hence incur a penalty. Also, the multiplicity of MySQL back-ends allows the user to mix them unintentionally, what is not possible with PostgreSQL. When all MySQL-specific advices are removed, the quality measure is about the same for both databases. However, as PostgreSQL schemas provide more information about referential integrity

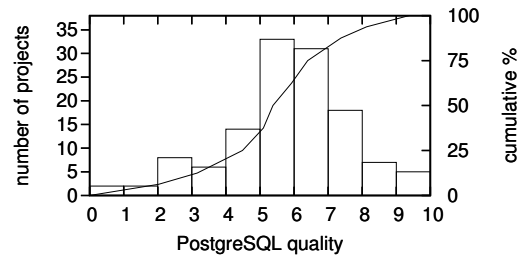
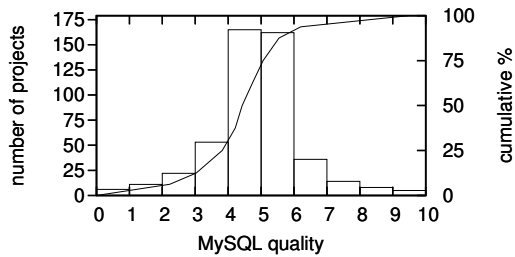


TABLE IV
QUALITY PER DECILE

		MySQL projects				
Size	nb	avg	σ	min	med	max
small	181	4.7 ± 1.4	0.0	4.0	4.5	9.5
medium	164	4.2 ± 1.3	0.0	4.3	8.7	
large	137	4.3 ± 1.4	0.0	4.4	8.2	

		PostgreSQL projects				
Size	nb	avg	σ	min	med	max
small	44	5.3 ± 2.0	0.0	5.3	9.4	
medium	37	5.5 ± 1.5	2.0	5.3	9.3	
large	45	5.3 ± 2.0	0.0	5.7	8.1	

TABLE V
QUALITY PER SIZE

		MySQL projects				
Category	nb	avg	σ	min	med	max
irc	12	5.1 ± 1.3	2.0	5.4	7.0	
mail	15	4.4 ± 1.7	1.7	4.7	8.4	
project	23	4.3 ± 1.4	0.0	4.6	6.2	
system	47	4.5 ± 1.4	0.0	4.5	9.5	
game	16	4.4 ± 2.0	0.9	4.5	9.1	
blog	27	4.4 ± 0.9	2.5	4.5	7.2	
forum	19	4.3 ± 0.9	2.4	4.4	5.7	
cms	82	4.2 ± 1.1	0.0	4.3	8.3	
homepage	12	4.1 ± 0.9	3.0	4.1	5.9	
market	22	4.0 ± 1.4	1.8	4.0	8.2	
accounting	12	4.4 ± 1.9	1.9	3.6	7.5	

		PostgreSQL projects				
Category	nb	avg	σ	min	med	max
teaching	3	7.9 ± 2.2	5.3	8.9	9.4	
blog	5	6.6 ± 1.1	5.3	6.4	8.2	
accounting	7	5.9 ± 2.0	2.0	6.4	7.8	
cms	12	6.1 ± 1.3	4.0	5.9	8.1	
irc	7	5.4 ± 1.7	2.0	5.6	7.4	
phone	6	5.2 ± 1.5	3.1	5.3	7.4	
project	13	5.4 ± 1.6	2.2	5.2	9.3	
system	22	5.0 ± 2.1	1.6	5.1	9.0	
mail	8	4.9 ± 1.6	3.0	4.8	7.5	
healthcare	5	3.2 ± 2.7	0.0	3.3	6.6	

TABLE VI
QUALITY PER PROJECT MAIN CATEGORIES

		MySQL projects				
Techno.	nb	avg	σ	min	med	max
python	5	5.9 ± 2.0	3.7	6.2	8.2	
sql	7	4.0 ± 2.5	0.0	5.3	5.9	
java	16	4.8 ± 2.8	0.0	5.2	9.5	
c++	6	4.8 ± 1.2	3.3	4.5	7.0	
c	33	4.6 ± 1.4	2.0	4.4	8.4	
php	391	4.4 ± 1.2	0.0	4.4	9.1	
perl	16	3.9 ± 2.1	0.0	4.3	8.7	
ruby	5	4.5 ± 0.9	3.7	4.2	5.6	

		PostgreSQL projects				
Techno.	nb	avg	σ	min	med	max
python	3	7.0 ± 0.6	6.6	6.8	7.7	
java	14	6.1 ± 2.4	0.0	6.8	9.3	
c++	2	6.7 ± 1.0	6.0	6.7	7.4	
perl	11	6.0 ± 1.9	2.0	6.1	8.9	
sql	2	5.8 ± 5.1	2.2	5.8	9.4	
php	64	5.2 ± 1.6	0.0	5.4	8.2	
ruby	3	5.1 ± 1.2	4.0	5.0	6.3	
c	26	4.8 ± 1.9	1.6	5.0	9.0	

TABLE VII
QUALITY PER PROJECT MAIN TECHNOLOGIES

		MySQL projects				
Date	nb	avg	σ	min	med	max
recent	160	4.3 ± 1.3	0.0	4.4	8.6	
older	322	4.4 ± 1.4	0.0	4.4	9.5	

		PostgreSQL projects				
Date	nb	avg	σ	min	med	max
recent	59	5.3 ± 1.6	0.0	5.3	9.3	
older	67	5.4 ± 2.0	0.0	5.6	9.4	

TABLE VIII
QUALITY PER PROJECT RELEASE DATE

constraints, they are also penalized as more advices can be raised based on the provided additional information.

Table IV shows the projects per quality decile. The PostgreSQL-only project quality is more spread than MySQL projects (*very sure*). Table V compares the quality of projects according to size, with small up to 9, medium up to 29, and large otherwise. The quality is quite evenly distributed among sizes, which suggests that our effort to devise a size-neutral grading succeeded. Table VI compares quality based on the project categories. The number of projects in each category is too small to draw deep conclusions. Table VII addresses the technology used in the project: Java leads while PHP is near bottom. PHP projects take less care of their relational design (*rather sure*), but this may be explained by the fact that MySQL is used more often in these projects. Finally, Table VIII shows that quality evaluation does not change much from old to recent projects.

V. CONCLUSION

This is the first survey on the quality of relational schemas in open-source software. The overall quality results are worse than envisioned at the beginning of the study. Although we did not expect a lot of perfect projects, having so few key declarations and referential integrity constraints came as a surprise. We must acknowledge that our assumption that data are precious, and that the database should help preserve its consistency by enforcing integrity constraints and implementing transactions, is not shared by most open-source projects, especially when based on MySQL and PHP. This is illustrated by bug report 15441 [70] about missing keys on tables in MEDIAWIKI: it had no visible effect after three years.

The first author contributed both to the best PostgreSQL project (COMICS), and to one of the worst MySQL project (SLXBBL), which is *Salix* executed on its own schema! This deserves an explanation: COMICS is a small database used for teaching SQL. The normalized schema emphasizes clarity and cleanliness with a pedagogic goal in mind. Even so, the two raised warnings deserve to be fixed, although one would require an additional attribute. SLXBBL tables generate a lot of errors, because they are views materialized for performance issues. Also, they rely on MyISAM because some SQL create table statements must be compatible with both MySQL and PostgreSQL to ease the tool portability. Nevertheless, the comparison of schemas allowed to find one bug: an attribute had a different name, possibly because of a bad copy-paste.

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APPENDIX
LIST OF ADVICES

- 1) **Schema without any FK** *schema design error*
Why use a relational database if data are not related at all? Well, that might happen...
- 2) **No attribute in table** *table design error*
There must be something in a table.
- 3) **Tables without PK nor Unique** *table design error*
All tuples must be uniquely defined to be consistent with the set theory. There is no unique subset of attribute which can be promoted as a PK.
- 4) **Nullable attribute rate over 80%** *schema design warning*
Warning: Most of the time, attributes should be NOT NULL. Too high a rate of nullable attribute may reveal that some fields are lacking a NOT NULL.
- 5) **Attribute count per table over 40** *table design warning*
Having so many attributes in the same table may reveal the need for additional relations.
- 6) **Composite Foreign Key** *table design warning*
As for primary keys, simple foreign keys are usually better design, and make updates easier.
- 7) **FK not referencing a PK** *table design warning*
A Foreign Key should rather reference a Primary Key.
- 8) **Integer PK but no other key** *table design warning*
A simple integer primary key suggests that some other key must exist in the table.
- 9) **Isolated Tables** *table design warning*
In a database design, tables are usually linked together.
- 10) **Large PK referenced by a FK** *table design warning*
Having large primary keys referenced by a foreign key may reveal data duplication, as the primary key is likely to contain relevant information.
- 11) **Tables without PK but with Unique** *table design warning*
All tables should have a primary key to be consistent with the set theory. A unique constraint may be promoted as the primary key.
- 12) **Attribute has a pseudo 'NULL' text default** *attribute design warning*
Possibly the NULL value was intended instead of the 'NULL' text.
- 13) **Unique nullable attributes** *attribute design warning*
A unique nullable attribute may be a bad design if NULL does not have a particular semantic.
- 14) **Nullable attribute rate in 50-80%** *schema design notice*
Notice: Most of the time, attributes should be NOT NULL. Too high a rate of nullable attribute may reveal that some fields are lacking a NOT NULL.
- 15) **Attribute count per table over 20** *table design notice*
Having many attributes in the same table may suggest the need for additional relations.
- 16) **Non-integer Primary Key** *table design notice*
Having integer primary keys without specific application semantics make updates easier.
- 17) **Table with a single attribute** *table design notice*
Possibly some more attributes are needed to have a semantic.
- 18) **Tables with Composite PK** *table design notice*
A simple primary key, without specific semantics, is usually a better design, and references through foreign keys are simpler.
- 19) **Nullable attribute rate in 20-50%** *schema design information*
Information: Most of the time, attributes should be NOT NULL. Too high a rate of nullable attribute may reveal that some fields are lacking a NOT NULL.
- 20) **FK length mismatch** *table consistency error*
A Foreign Key should have matching referencing and referenced type sizes.
- 21) **FK type mismatch** *table consistency error*
A Foreign Key should have matching referencing and referenced types.
- 22) **Destination table and FK in different schemas** *table consistency warning*
A constraint and its destination table are usually in the same schema.
- 23) **Source table and constraint in different schemas** *table consistency warning*
A constraint and its source table should be in the same schema.
- 24) **Table and index in different schemas** *table consistency warning*
An index and its table should be in the same schema.
- 25) **Tables linked but in different schemas** *table consistency notice*
Linked tables are usually in the same schema.
- 26) **Backend engine inconsistency** *schema version error*
Different backends are used in the same database. It may be legitimate to do so if a particular feature of one backend is needed, for instance full text indexes.
- 27) **Unsafe backend engine used in schema** *schema version warning*
An unsafe backend (e.g. MyISAM) used at least once lacks referential integrity, transaction support, and is not crash safe.
- 28) **MySQL is used** *database version notice*
MySQL lacks important features of the SQL standard, including missing set operators.
- 29) **Unsafe backend engine used on table** *table version information*
An unsafe backend (e.g. MyISAM) lacks referential integrity, transaction support, and is not crash safe.
- 30) **Schema name length too short** *schema style warning*
A schema name with less than 3 characters is really too short.
- 31) **Table name length too short** *table style warning*
A table name with less than 2 characters is really too short.
- 32) **Attribute name length too short** *attribute style warning*
An attribute name with 1 character is really too short.
- 33) **Homonymous heterogeneous attributes** *attribute style warning*
Better avoid using the same attribute name with different types on different tables in the same application, as it may confuse the developer.
- 34) **Mixed table name styles** *schema style notice*
Better use homogeneous table names.
- 35) **Schema name length quite short** *schema style notice*
A schema name with 4 characters is quite short.
- 36) **Mixed attribute name styles** *table style notice*
Better use homogeneous attribute names.
- 37) **Table name length quite short** *table style notice*
A table name with 3 characters is quite short.
- 38) **Attribute name length quite short** *attribute style notice*
An attribute name of 2 characters is quite short (but "id" and "pk").
- 39) **Attribute named after its table** *attribute style notice*
An attribute contains the name of its table, which is redundant.
- 40) **Schema name length short** *schema style information*
A schema name with 5 characters is short.
- 41) **Table name length short** *table style information*
A table name with 4 characters is short.
- 42) **Attribute name length short** *attribute style information*
An attribute name with 3 characters is short.
- 43) **SuperUser with weak password** *user system error*
SuperUser with empty or username password.
- 44) **Redundant FK** *table system warning*
Redundant Foreign Keys are costly to maintain.
- 45) **Redundant indexes** *table system warning*
Redundant indexes are costly to maintain.
- 46) **User with weak password** *user system warning*
User with empty or username password.
- 47) **Table without index** *table system notice*
Not a single index on a table.

APPENDIX
LIST AND GRADES OF PROJECTS

TABLE IX: All Projects

<i>Project</i>	<i>Tech</i>	<i>Cat</i>	<i>Version</i>	<i>Released</i>	<i>URL</i>
2532gigs	php	music	1.2.2	2008-01-28	www.2532gigs.com
4images	php	photo	1.7.4	2008-02-05	www.4homepages.de
4site	php	cms	2.6	2008-06-24	www.4site.ru
acid	php	system	0.9.6b23	2003-08-01	acidlab.sourceforge.net
adbutterfly	php	market	1.4	2008-01-02	www.butterflymedia.ro
adcycle	perl	market	1.26	2003-01-01	www.adcycle.com
adempiere	java	accounting	3.3.1b	2008-02-07	www.adempiere.com
admgr	php	market	0.96.1a	2001-04-12	www.digitekdesign.com
aigaion	php	reference	2.0.2.beta	2008-03-11	www.aigaion.nl
ajaxchat	php	chat	0.8.3	2009-06-26	sourceforge.net
akinatorclon	sql	game	20101017	2010-10-17	akinator.sourceforge.net
alguest	php	home	1.1c	2002-07-26	sourceforge.net
alumni	php	student	1.0.9	2007-06-05	sourceforge.net
ampache	php	music	3.4	2008-05-10	ampache.org
andromeda	php	framework	2008.03.04	2008-03-04	www.andromeda-project.org
angora	php	homepage	1.5	2010-06-22	aguestbook.sourceforge.net
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anymeal	c++	homepage	0.30	2006-10-26	sourceforge.net
apertoblog	php	blog	0.1.1	2008-03-02	code.google.com
arfoo	php	market	1.0.1	2008-03-20	arfoo.com
aspseek	c	search	1.2.10	2002-07-22	www.aspseek.org
asterisk	c	phone	1.4.17	2008-02-21	www.asterisk.org
astguiclient	pl	phone	2.2.1	2010-05-11	www.vicidial.org
asvcs	php	project	0.9.7	2008-03-02	asvcs.com
atarone	php	cms	1.3	2008-12-03	atarone.sourceforge.net
avantfax	php	fax	3.3.3	2010-09-17	avantfax.sourceforge.net
awmysql	sql	game	20100318	2010-03-18	awmysql.sourceforge.net
awzmb	php	blog	4.2beta1	2007-04-16	sourceforge.net
b2evolution	php	blog	1.10.3	2008-01-23	b2evolution.net
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bandwebsite	php	music	1.5	2002-03-27	membres.lycos.fr
bandwidthd	c	system	2.0.1	2005-01-11	sourceforge.net
banex	php	advert	2.2.1	2002-05-03	banex.sourceforge.net
barryvancomp	php	cms	0.5pre1	2008-02-28	barryvancomp.sourceforge.net
base	php	system	1.3.9	2007-11-20	base.secureideas.net
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boastmachine	php	cms	3.1	2005-06-05	boastology.com
boxroom	ruby	community	0.6.2	2007-05-21	boxroom.rubyforge.org
brewblogger	php	beer	2.3.2	2010-11-18	www.brewblogger.net
bricolage	perl	cms	1.11.2	2009-11-14	bricolagecms.org
bugzilla	perl	project	3.0.2	2008-02-01	www.bugzilla.org
cacti	php	system	0.8.7b	2008-02-11	www.cacti.net
candid	php	cms	2.50	2005-04-12	sourceforge.net
care2x	php	healthcare	2.2	2006-08-02	www.care2x.org
categorizato	php	address	0.3.10	2006-04-06	www.categorizator.org
centreon	php	system	1.4.2.4	2008-03-03	www.centreon.com
churchinfo	php	church	1.2.12	2010-06-07	www.churchdb.org
clantiger	php	cms	1.1.2	2009-04-20	www.clantiger.com
claroline	php	student	1.9.6	2010-09-10	sourceforge.net
class	php	student	0.9.20	2010-05-24	class.sourceforge.net
cleancms	php	cms	1.5	2008-09-30	www.4yoursite.nl
clinicweb	java	healthcare	3.27	2009-08-07	clinicweb.sourceforge.net

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connotea	perl	reference	1.8beta	2007-08-31	www.connotea.org
copperminephp	php	photo	1.4.19	2008-08-03	coppermine-gallery.net
countmysql	php	home	1.0	1998-12-10	open.appideas.com
cplinks	php	search	1.03	2007-05-24	www.cplinks.com
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crownevan	php	game	0	2004-04-21	www.phpkode.com
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ctn	java	healthcare	3.0.6	2003-03-11	erl.wustl.edu
cubecart	php	market	3.0.20	2009-08-03	cubecart.com
cuteflow	php	cms	2.11.2	2009-08-28	cuteflow.org
dagger	php	cms	r12feb2008	2008-02-12	labs.geody.com
davical	php	calendar	0.9.9	2010-04-17	www.davical.org
dbmail	c	mail	2.3.1	2008-02-09	www.dbmail.org
deadlock	php	system	1.01	2007-05-23	www.phpdeadlock.org
dekiwiki	php	wiki	1.8.3a	2008-01-16	sourceforge.net
deluxebb	php	community	1.3	2009-02-06	www.deluxebb.com
devana	php	game	1.6.6	2010-01-10	www.devana.eu
dogarchive	php	pet	1.2.1	2009-06-04	dogarchive.sourceforge.net
dolibarr	php	accounting	2.7.1	2009-12-30	www.dolibarr.org
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dorcman	php	cms	3.0.2	2004-07-22	open.appideas.com
dotaos	php	game	1.3.0	2010-12-16	dotaopenstats.sourceforge.net
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dotproject	php	project	2.1.1	2007-11-13	www.dotproject.net
dpsearch	c	search	4.48	2008-02-10	www.dataparksearch.org
drupal	php	cms	5.7	2008-02-13	drupal.org
dspace	java	cms	1.5.0	2008-03-25	www.dspace.org
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dte	php	system	0.28.2	2008-02-19	www.gplhost.com
dvwa	php	teaching	1.0.7	2010-09-08	www.dvwa.co.uk
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edcontainer	php	cms	2.22	2003-12-10	edreamers.org
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ejabberd	erlang	irc	2.0.0.rc1	2008-02-21	www.process-one.net
elgg	php	blog	0.9	2008-02-25	elgg.org
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encapsaller	php	photo	1.10	2008-02-16	www.encaps.net
entrans	php	translation	0.3.3	2010-09-14	sourceforge.net
epiware	php	dms	4.8.6	2008-04-30	sourceforge.net
eqdkp	php	game	1.4.0b1	2008-05-23	eqdkp.com
etomite	php	cms	1.1	2009-09-13	www.etomite.com
evergreen	perl	library	1.2.1.2	2008-02-15	www.open-ils.org
exponentcms	php	cms	0.96.6	2007-10-03	exponentcms.org
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faqmasterfle	php	faq	1.2	2006-03-29	www.lethalpenguin.net
flexphpsite	php	cms	0.0.7	2008-10-30	www.china-on-site.com
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formmail	php	mail	0.9	2008-12-10	code.google.com
fossology	c	project	1.2.0	2010-07-08	fossology.org
fowlcms	php	cms	1.1	2009-04-15	fowlcms.sourceforge.net
freeglobes	php	address	16.01.2008-rc2	2008-01-16	www.freeglobes.net
freeradius	c	system	2.0.1	2008-02-14	freeradius.org
freeschool	php	student	1.1.0	2008-06-23	freeschool.istruzioneego.eu

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fretsweb	php	music	1.3.4	2009-06-18	sourceforge.net
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genovaweb	.net	game	1.0.1.0	2008-11-10	code.google.com
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glpi	php	system	0.70.2	2008-01-27	glpi-project.org
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gnumed	python	healthcare	0.2.8.1	2007-10-01	www.gnumed.org
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grouppofficec	php	groupware	3.00-stable-2	2008-12-03	www.group-office.com
habari	php	blog	0.6.6	2010-12-04	habariproject.org
horde	php	mail	3.2	2008-05-25	www.horde.org
htcheck	php	system	1.2.4-rc1	2006-07-04	htcheck.sourceforge.net
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idoc	php	cms	0.1	2006-04-04	idoc.sourceforge.net
igamingcms	php	cms	1.5	2007-09-08	www.igamingcms.com
impresscms	php	cms	1.1	2008-10-31	www.impresscms.org
indimail	c	mail	1.7.11	2010-11-05	indimail.sourceforge.net
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ipplan	php	system	4.86a	2007-06-19	iptrack.sourceforge.net
isql	perl	music	0.6stable	2005-08-19	kisql.sourceforge.net
itequipments	java	system	beta1	2008-06-01	code.google.com
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jabberd	c	irc	2.1.22	2008-02-03	jabberd2.xiaoka.com
jabref	java	reference	2.4.2	2008-11-01	jabref.sourceforge.net
jffnms	php	system	0.8.3	2006-09-16	www.jffnms.org
joomla	php	cms	1.5.0	2008-02-22	www.joomla.org
jwhoisserver	java	system	0.3.3.0	2010-12-12	jwhoisserver.net
kannel	c	phone	1.4.3	2009-02-04	www.kannel.org
khcoder	php	language	2.beta.24	2010-11-11	khc.sourceforge.net
kissabe	php	reference	2.0	2008-09-14	code.google.com
knowledgeroo	php	cms	0.9.8.5	2007-10-10	www.knowledgeroot.org
knowledgedtre	php	cms	3.5.2	2008-03-05	www.knowledgetree.com
koha	perl	library	2.2.9	2008-01-08	www.koha.org
kool	php	community	r29a	2008-02-02	www.churchtool.org
kvwmap	php	gis	1.7.5	2010-09-15	kvwmap.sourceforge.net
laconica	php	blog	0.6.4.3	2008-12-15	laconi.ca
ledgersmb	perl	accounting	1.2.21	2010-03-18	ledgersmb.org
lifetype	php	blog	1.2.6	2008-01-23	lifetype.net
lighttrack	php	p2p	130705	2005-07-13	lighttrack.net
liblogs	php	blog	1.0.0	2008-09-10	code.google.com
limesurvey	php	survey	1.70+	2008-03-01	www.limesurvey.org
linkupfree	php	advert	20090518	2009-05-18	phpwebscripts.com
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livestreet	php	cms	0.4.2	2010-12-03	livestreetcms.com
lovecms	php	cms	1.6.2	2007-10-16	lovecms.org
maarchenterp	php	dms	1.0	2009-12-21	www.maarch.org
mambo	php	cms	4.6.2	2007-04-24	www.mamboserver.com
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mappyemails	php	mail	0.0.1	2008-05-09	code.google.com
maxblog	php	blog	1.0.6	2008-12-22	www.mzbservices.com
mcguestbook	php	homepage	1.3	2003-07-25	www.phpforums.net
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microcms	php	cms	3.5	2006-03-15	www.impliedbydesign.com
minibb	php	forum	2.1	2008-02-14	www.minibb.net
mirrored	php	healthcare	1.0rc3	2006-07-26	www.mirrored.org
mlf	php	forum	2.2.6	2010-07-10	mylittleforum.net
mnogosearch	php	search	3.3.6	2007-11-27	www.mnogosearch.org
modserv	c	irc	2.001	2005-08-25	modserv.sourceforge.net
modx	php	cms	0.9.6.1p2	2008-02-13	modxcms.com
moodle	php	course	1.8.4	2008-01-11	moodle.org
mose	php	account	1.0	2009-03-27	sourceforge.net
motion	c	video	3.2.11.1	2009-08-11	sourceforge.net
movabletype	perl	blog	4.1	2008-02-25	www.movabletype.org
mrbs	perl	booking	1.4.4.1	2010-04-22	sourceforge.net
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ndoutils	c	system	1.4b7	2007-10-31	www.nagios.org
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nucleus	php	blog	3.32	2008-01-29	www.nucleuscms.org
nurpawiki	php	wiki	1.2.2	2008-10-14	code.google.com
oasis	php	market	2.3b	2007-08-13	oasis.sourceforge.net
obmui	php	system	2.1.9	2008-04-06	obm.org
ocs	php	conference	2.0.0-1	2007-05-16	pkp.sfu.ca
odminko	php	cms	0.9.666	2008-02-18	code.google.com
omegaannounce	php	market	1.4.0	2008-03-19	www.phpsources.org
onecms	php	cms	2.5	2008-01-16	sourceforge.net
oneorzero	php	project	1.6.5.7	2008-02-23	www.oneorzero.com
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openclassifi	php	advert	1.7.0.3b	2010-09-21	open-classifieds.com
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opendocman	php	dms	1.2.5.7	2010-04-28	www.opendocman.com
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openfire	java	irc	3.4.4	2008-02-07	www.igniterealtime.org
openmrs	java	healthcare	1.2	2008-01-11	openmrs.org
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openser	c	phone	1.3.0	2007-12-13	www.opensips.org
opensurveyypi	php	survey	1.2.1	2006-06-08	www.opensurveyipilot.org
openx	php	market	2.4.5	2008-04-15	www.openx.org
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ortus	php	cms	1.13.1	2008-09-07	ortus.nirn.ru
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panews	php	homepage	2.0b4	2005-08-01	www.phparena.net
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passmasterfl	php	login	1.2	2005-08-16	www.lethalpenguin.net
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phpbms	php	accounting	0.96	2008-05-15	phpbms.org
phpbp2	php	portal	rc3-2.204	2006-01-21	www.phpbp.com
phpbttracker	php	p2p	1.5e	2005-02-20	dehacked.2y.net
phpbtrkplus	php	p2p	2.2	2006-11-27	phpbtrkplus.sourceforge.net
phpcoin	php	accounting	1.6.5	2009-09-26	www.phpcoin.com
phpcollab	php	project	2.5rc3	2005-06-03	www.php-collab.com
phpcomasy	php	cms	0.8.2	2007-08-07	www.phpcomasy.com
phpcommunity	php	calendar	4.0.3	2002-04-16	open.appideas.com
phpdevshell	php	framework	0.8.4	2008-03-04	www.phpdevshell.org
phpdj	php	music	0.5	2006-06-24	sourceforge.net
phpeasydata	php	address	1.5.4	2007-01-22	www.phpeasydata.com
phpechocms	php	cms	2.0rc3	2007-04-20	sourceforge.net
phpeppershop	php	market	1.4	2007-12-20	www.phpeppershop.com
phpesp	php	survey	2.1.4	2010-01-12	sourceforge.net
phpetition	php	market	0.3.1	2001-10-28	sourceforge.net
phpfusion	php	cms	6.01.13	2007-11-04	php-fusion.sourceforge.net
phpgedview	php	genealogy	4.1.5	2008-04-27	www.phpgedview.net
phpgroupware	php	groupware	0.9.16.012	2007-08-14	www.phpgroupware.org
phpinventory	php	inventory	1.2	2009-03-24	www.phpwares.com
phpirc	php	chat	2.2.1	2006-04-08	sourceforge.net
phplist	php	cms	2.10.8	2008-12-09	www.phplist.com
phpmyadmin	php	system	2.11.8.1	2008-07-28	www.phpmyadmin.net
phpmybittorr	php	p2p	1.2.2	2007-08-08	phpmybittorrent.com
phpmychat	php	irc	1.92-f7	2008-07-26	www.phpheaven.net
phpmyfamily	php	genealogy	1.4.2	2007-12-09	www.phpmyfamily.net
phpmyfaq	php	faq	2.0.6	2008-02-24	www.phpmyfaq.de
phpmylibrary	php	library	2.2.1-3	2006-04-30	sourceforge.net
phpmynewslet	php	mail	0.8b5	2005-11-20	gregory.kokanosky.free.fr
phpmypartena	php	address	1.0	2006-06-06	phpmypartenaire.phpsources.org
phpmy prepaid	php	accounting	0.4rc3	2009-04-19	phpmy prepaid.sourceforge.net
phpmysport	php	community	1.4	2009-03-03	phpmysport.sourceforge.net
phpmytourney	php	game	v2	2003-11-09	phpmytourney.servegame.com
phpnuke	php	cms	8.0	2008-02-01	phpnuke.org
phpope	php	cms	1.0.0	2003-10-16	sourceforge.net
phporganisat	php	accounting	1.0beta4	2008-07-18	sourceforge.net
phpppm	php	project	0.8.11	2007-10-29	phpppm.org
phpprofileli	php	community	4.5.3beta	2008-02-28	linuxwebshop.com
phprealtimes	php	system	1.0	2003-12-30	www.giombetti.com
phpprpg	php	game	0.8.0	2006-05-21	phpprpg.org
phpschedulei	php	calendar	1.2.12	2010-02-13	www.php.brickhost.com
phpsge	php	game	037	2010-12-12	phpstrategygame.sourceforge.net
phpshop	php	market	0.8.1	2008-05-12	www.phpshop.org
phpsimplecha	php	irc	0.2	2008-03-10	www.ebrueggeman.com
phpslash	php	cms	0.8.1.1	2006-01-15	sourceforge.net
phpstats	php	system	0.1.9.2	2007-08-10	php-stats.com
phptransform	php	cms	1	2010-02-19	phptransformer.com
phpvideopro	php	video	0.9.7	2010-05-09	projects.izzysoft.de
phpwebgaller	php	photo	1.7.0	2008-01-25	piwigo.org
phpwebnews	php	cms	0.2	2004-06-17	phpwebnews.sourceforge.net
phpwebportai	php	cms	2.5.1.1	2007-02-15	sourceforge.net

phpwiki	php	wiki	1.3.14	2007-07-01	phpwiki.sourceforge.net
phreebooks	php	accounting	r2.1	2010-07-06	www.phreebooks.com
piwigo	php	photo	2.0.8	2010-01-26	piwigo.org
piwik	php	system	0.5.1	2009-12-10	piwik.org
pixelpost	php	blog	1.7.1	2008-01-14	www.pixelpost.org
pixiecms	php	cms	1.01a	2009-02-02	www.getpixie.co.uk
plans	perl	calendar	7.10	2007-11-27	www.planscalendar.com
plazma	java	erp	0.1.9	2010-05-31	plazma.sourceforge.net
pligg	php	cms	9.9.0beta	2008-01-01	www.pligg.com
pmacct	c	system	0.12.0rc4	2009-12-21	www.pmacct.net
pmailsvr	python	mail	1.0.0.0	2008-05-22	code.google.com
pmb	php	library	3.0.26	2006-09-01	www.sigb.net
pmdb	php	movies	0.3	2004-02-10	pmdb.altervista.org
pokernetwork	php	game	1.5.0	2008-05-10	pokersource.info
poplar	php	genealogy	2.0	2004-01-18	poplar.sourceforge.net
postbooks	c	accounting	3.2.1	2009-02-11	postbooks.sourceforge.net
postnuke	php	cms	0.8.0.0rc3	2008-02-19	www.postnuke.com
prestashop	php	market	1.0	2008-07-31	www.prestashop.com
projectnet	java	project	8.3.1	2008-02-27	www.project.net
projectpier	php	project	0.8.0	2008-02-19	www.projectpier.org
prophp	php	market	20071218	2007-12-18	www.bkworksproducts.info
punbb	php	forum	1.2.17	2008-02-19	punbb.org
qsf	c	mail	1.2.7	2007-08-28	www.ivarch.com
qsgen	php	game	0.7.2c	2007-02-28	www.quantum-star.com
qtregistrati	php	community	1.6.0.1	2009-01-01	www.qt-cute.org
quartz	java	project	1.6.0	2006-08-27	www.opensymphony.com
quicksilverf	php	forum	1.4.1	2007-09-30	www.quicksilverforums.com
quicktalkfor	php	forum	1.9.0.3	2008-10-01	www.qt-cute.org
quicktalkgue	php	homepage	1.7	2008-06-01	www.qt-cute.org
quickteam	php	community	1.9.0.3	2008-10-01	www.qt-cute.org
quicketicket	php	project	1.9.0.3	2008-09-30	www.qt-cute.org
radiant	ruby	cms	0.6.4	2008-02-26	radiantcms.org
rasmp	php	cms	2.0.1	2006-01-15	www.rasadam.com
ratboxservic	c	irc	1.1.2	2007-04-21	services.ircd-ratbox.org
rechnungszen	php	market	1.1.6	2006-09-23	www.phpsources.org
redmine	ruby	project	1.0.1	2010-08-22	www.redmine.org
reececalenda	php	calendar	0.9	2008-03-01	reececalendar.sourceforge.net
refbase	php	reference	0.9.0	2006-10-25	refbase.sourceforge.net
refdb	php	reference	0.9.9.1	2007-11-07	refdb.sourceforge.net
riotpix	php	forum	0.61	2008-12-28	www.riotpix.com
roller	java	blog	4.0	2007-12-05	rollerweblogger.org
roomphpplann	php	misc	1.5	2004-09-13	www.beaussier.com
roundcubemai	php	mail	0.1rc2	2007-10-21	roundcube.net
rsyslog	c	system	3.10.3	2008-02-25	www.rsyslog.com
rt	perl	project	3.8.1	2008-08-18	www.bestpractical.com
satchmo	python	market	0.6	2007-10-30	www.satchmoproject.com
saturncms	php	cms	16dec07	2007-12-16	www.saturncms.com
saxon	php	news	6.2	2008-02-29	www.quirm.net
sblog	php	blog	0.7.3.beta	2006-03-09	sourceforge.net
sbnc	c++	irc	1.2	2007-12-30	www.shroudbnc.info
scalix	java	mail	11.3.0	2008-01-07	www.scalix.com
schoorbs	php	booking	1.0.4	2008-09-13	schoorbs.xhochy.com
scoop	php	cms	1.1.8	2006-08-13	scoop.kuro5hin.org
scuttle	php	community	0.7.2	2006-04-27	scuttle.org
securityscan	php	system	1.0.2	2007-06-07	sourceforge.net
segue	php	cms	2.2.10.2	2009-06-16	sourceforge.net
ser	c	phone	0.9.7	2008-10-17	www.iptel.org
serendipity	php	blog	1.2.1	2007-12-08	www.s9y.org
sharedtree	php	genealogy	r79	2008-01-24	www.sharedtree.com
shoppingcart	php	market	0.9	2006-07-03	www.phpsources.org
shoutbox	php	homepage	1.0.1	2008-01-08	www.mapos-scripts.de
shutter	php	photo	0.1.1	2008-05-13	shutter.tenfourzero.net
silverstripe	php	cms	2.2.1	2007-12-21	silverstripe.com
simplecustom	php	address	0	2008-10-28	www.simplecustomer.com
simpleticket	ruby	project	1.0	2006-11-08	www.simpleticket.net
simtrain	php	student	1.20	2009-02-24	simtrain.sourceforge.net
serv	c	irc	3.0.8	2006-02-09	www.serv.net
sisu	ruby	markup	0.67.0	2008-05-22	sisudoc.org
sitebar	php	homepage	3.3.9	2007-10-14	sitebar.org

slash	perl	blog	2.2.6	2008-01-07	www.slashcode.com
slimcms	php	cms	1.0.0	2008-07-29	sourceforge.net
slxbbl	sql	system	0.2.0	2008-08-31	coelho.net
smartblog	php	blog	2.1	2006-03-11	toocharger.com
smbaudit	php	system	0.3.7	2008-08-30	smbaudit.sourceforge.net
smf	php	forum	1.1.4	2007-09-23	www.simplemachines.org
smi	php	music	0.3.4	2009-11-20	www.smiproject.org
snogs	php	blog	beta1	2008-06-08	cakeforge.org
snort	c	system	2.8.0.1	2008-02-26	www.snort.org
socialshare	php	teaching	20100605	2010-06-05	socialshare.sourceforge.net
solarcms	php	cms	0.53.3.5	2008-11-23	cms.maury91.org
specter	c	system	1.4	2008-01-07	joker.linuxstuff.pl
sphider	php	search	1.3.4	2008-04-29	www.sphider.eu
spip	php	cms	1.9.2d	2008-01-27	www.spip.net
sqlfamilytre	php	genealogy	50	2002-06-03	sourceforge.net
sqlgrey	perl	mail	1.7.6	2007-08-05	sqlgrey.sourceforge.net
sqlledger	perl	accounting	2.8.11	2008-02-20	www.sql-ledger.org
squirrelmail	php	mail	1.4.13	2007-12-14	www.squirrelmail.org
srsv	perl	irc	0.4.2pre4	2007-05-29	www.surrealchat.net
streber	php	project	0912	2009-12-12	www.streber-pm.org
studs	php	agenda	0.6.3	2009-11-23	sourcesup.cru.fr
sugarcrm	php	market	5.1beta1	2008-04-30	www.sugarcrm.com
supercali	php	calendar	1.0.6	2008-09-30	www.phpsources.org
surrealtodo	php	todo	0.6.1	2010-12-14	getsurreal.com
sympa	perl	mail	5.3.4	2008-02-04	www.sympa.org
tagadash	php	cms	1.2.18a	2008-01-28	www.patrickhamy.net
tahoe	sql	dev	2011beta	2010-11-29	jkempski.w.interia.pl
tanal	php	system	4.5	2008-11-06	code.google.com
tangocms	php	cms	1.0.8	2008-01-18	www.tangocms.org
taskfreak	php	project	0.6.2	2008-04-06	www.taskfreak.com
tavi	php	wiki	0.26	2005-03-31	tavi.sourceforge.net
tbsource	php	p2p	0.1alpha	2007-09-11	tb-source.info
tcw	php	project	0.2.16d	2006-07-05	tcw.sourceforge.net
techttables	php	project	20031117	2003-11-17	techttables.sourceforge.net
testlink	php	project	1.7.3	2008-02-19	www.teamst.org
testmaster	perl	project	1.1.0b3	2004-11-10	testmaster.sourceforge.net
textpattern	php	blog	4.0.6	2008-02-03	www.textpattern.com
tgs	php	cms	0.3.0	2007-09-30	www.tgs-cms.de
thales	c	irc	1.0	2004-05-09	www.gnu.org
tigase	java	irc	3.0.2	2007-10-18	www.tigase.org
tikiwiki	php	cms	4.2	2010-03-06	www.tikiwiki.org
timeclock	php	management	1.04	2007-11-15	timeclock.sourceforge.net
tinierp	python	accounting	4.2.1	2008-02-13	www.tinierp.org
tmevolution	php	music	1.7rev5	2007-04-16	tm-evolution.sourceforge.net
torrentflux	php	p2p	2.3final	2006-12-12	www.torrentflux.com
torrenttrade	php	p2p	2.04	2008-03-13	www.torrenttrader.org
trac	python	project	0.11b1	2008-02-27	trac.edgewall.org
trcms	php	cms	prealpha2	2007-03-22	sourceforge.net
trilonis	java	healthcare	0.0.002	2005-01-10	sourceforge.net
truc	php	project	0.12.0	2008-02-19	truc.sourceforge.net
tryton	python	accounting	1.6.1	2010-08-31	www.tryton.org
tsep	php	search	0.0943r2	2010-10-31	tsep.info
typo	ruby	cms	5.0.2	2008-02-24	www.typosphere.org
typo3	php	cms	4.2.0	2008-04-23	typo3.org
ueberp	php	project	1.0	2004-11-24	ueberp.sourceforge.net
ulogd	c	system	1.24	2004-10-03	www.netfilter.org
uma	php	system	1.0.4.1	2004-11-24	sourceforge.net
urdabrunn	php	genealogy	0.1.0	2005-04-12	urdabrunn.sourceforge.net
usebb	php	forum	1.0.8	2007-09-29	www.usebb.net
vanilla	php	forum	1.1.4	2007-10-21	getvanilla.com
videodb	php	video	3.0.3	2009-03-05	videodb.net
vikingboard	php	forum	0.1.2	2007-12-03	sourceforge.net
voipmonitor	c++	phone	2.0	2010-10-16	www.voipmonitor.org
vtigercrm	php	market	5.0.3	2007-05-31	www.vtiger.com
vufind	php	library	0.7	2007-12-12	www.vufind.org
vwar	php	game	1.6.1r2	2008-02-15	www.stylewar.co.uk
wackowiki	php	wiki	r4.2	2005-03-27	wackowiki.com
webalbum	php	photo	2.04	2007-12-16	web-album.org
webcalendar	php	misc	1.2b1	2008-02-25	www.k5n.us

webedition	php	cms	6.1.0.2	2010-11-03	www.webedition.org
weberp	php	accounting	3.08	2008-02-08	www.weberp.org
webid	php	auction	0.8.5p1	2010-01-27	www.webidsupport.com
webspell	php	cms	4.2.0f	2008-05-02	www.webspell.org
websubrev	php	conference	0.61	2007-12-01	people.csail.mit.edu
webtopliste	php	address	1.3	2007-12-10	www.webtopliste.com
webtorrent	php	p2p	0.2.4alpha	2005-06-10	webtorrent.sourceforge.net
wfb2sql	perl	teaching	0.6	2004-02-06	wfb2sql.sourceforge.net
wiclear	php	wiki	1.0	2007-07-08	wiclear.free.fr
wikindx	php	reference	3.8.2	2008-02-05	wikindx.sourceforge.net
wikka	php	wiki	1.1.6.3	2007-05-07	wikkawiki.org
wiklink	php	wiki	0.1.3	2005-04-05	www.erational.org
winventory	php	system	0.9.00.pre.6	2005-12-13	winventory.sourceforge.net
wordpress	php	blog	2.3.2	2008-02-05	wordpress.org
wpquiz	php	survey	2.7	2005-03-23	www.wireplastik.com
wview	c	weather	5.17.3	2010-05-16	www.wviewweather.com
wzdftpd	c	system	0.8.3	2007-11-13	www.wzdftpd.net
x7chat	php	chat	2.0.5.1	2008-01-12	x7chat.com
xaraya	php	cms	1.1.4full	2008-01-03	www.xaraya.com
xbttracker	php	p2p	0.2.6	2008-02-02	xbtt.sourceforge.net
xinco	php	dms	2.00.10rc3	2010-12-03	www.xinco.org
xomol	php	cms	1.20071213	2007-12-13	www.xomol.net
xoops	php	cms	2.0.18.1	2008-02-16	www.xoops.org
xrms	php	crm	1.99.2	2006-07-25	xrms.sourceforge.net
yaap	php	phone	1.5	2006-11-20	yaap.oskbraniewo.pl
zabbix	c	system	1.4.4	2007-12-17	www.zabbix.com
zcs	java	mail	5.0.2_ga	2008-01-31	www.zimbra.com
zencart	php	market	1.3.8a	2007-11-30	www.zen-cart.com
zenith	php	photo	0.9.4	2007-07-09	zenithpg.sourceforge.net
zipmasterfle	php	file	1.0	2003-06-27	www.lethalpenguin.net
zomplog	php	blog	3.8.2	2007-11-18	www.zomp.nl
zoneminder	php	misc	1.23.3	2008-04-27	www.zoneminder.com
zoph	php	photo	0.7.0.4	2008-05-25	www.nother.net
zpaniqab	java	address	1	2008-07-17	code.google.com

TABLE X: MySQL Project Summary

Project Name	Size			Advice counts				Mark
	Tab	Att	Cns	Err	War	Not	Inf	
2532gigs	3	23	3	1	4	2	3	4.3
4images	15	118	12	5	8	4	15	4.2
4site	17	106	20	1	19	18	18	1.3
acid	4	25	4	1	3	4	4	5.1
adbutterfly	3	18	4	1	3	4	3	5.2
adcycle	40	399	9	32	26	27	45	1.8
admgr	3	37	1	3	3	4	4	1.9
aigaion	24	153	23	2	15	19	29	5.1
ajaxchat	4	21	1	4	2	4	4	2.1
akinatorclone	4	11	4	3	7	7	7	0.9
alguest	1	7	1	0	3	1	2	6.0
alumni	7	48	9	1	7	9	7	4.4
ampache	30	179	28	4	34	10	43	4.2
angora	9	80	13	1	7	6	9	5.1
announcemailfree	1	8	1	0	2	2	1	6.9
anope	21	180	39	2	5	2	32	6.1
anymeal	9	32	8	4	2	7	10	4.4
apertoblog	5	37	5	1	6	2	7	4.5
arfoo	20	100	18	4	17	7	25	4.3
aspseek	29	282	30	5	28	5	50	4.3
astguiclient	106	1496	82	32	71	54	114	2.9
asvcs	5	26	5	1	5	5	5	4.8
atarone	3	13	2	2	4	1	3	2.5
avantfax	14	103	14	1	16	3	14	4.2
awmysql	70	479	69	2	51	66	1	5.8
awzmb	3	51	3	1	4	6	5	4.0
b2evolution	31	246	65	1	28	23	2	4.6
bacula	21	177	22	2	20	42	27	4.1

bandwebsite	12	59	9	5	9	1	17	3.6
banex	2	20	5	1	1	1	5	6.5
barryvancompo	6	31	6	1	4	4	0	6.0
base	6	34	6	1	5	3	7	5.0
bbpress	8	58	9	2	7	3	2	2.4
beehiveforum	50	335	49	2	35	27	58	5.0
bibadmin	17	182	12	6	10	14	24	3.6
biblesql	4	20	9	1	4	1	9	5.9
biblesupersearch	4	20	4	1	5	1	4	4.5
biblioperasql	15	78	16	2	10	15	20	4.8
bibus	6	50	6	2	6	5	8	3.7
bigstreet	30	174	55	1	36	19	3	4.2
blogcms	38	208	41	10	19	16	46	4.4
blogpixelmotion	6	25	6	1	9	1	6	4.2
boardplus	1	6	0	1	1	2	1	3.9
boastmachine	10	88	9	2	10	5	13	4.2
boxroom	8	37	6	3	7	2	0	3.7
brewblogger	23	780	23	1	29	56	27	3.1
bricolage	119	669	391	1	68	32	14	5.5
bugzilla	54	272	67	8	33	8	60	4.8
cacti	48	336	47	2	39	39	52	4.8
candid	13	86	12	2	16	7	16	3.9
care2x	132	2055	130	11	128	168	147	4.4
categorizator	7	58	10	2	5	2	10	4.8
centreon	91	838	210	2	129	145	21	2.4
churchinfo	44	407	55	9	18	32	46	4.6
clantiger	33	270	29	6	40	11	46	3.9
claroline	28	185	30	1	24	27	30	4.8
class	67	512	69	2	49	73	75	5.0
cleancms	3	16	4	2	1	3	4	4.7
clinicweb	89	922	109	8	157	98	27	1.7
communitycms	15	94	14	2	20	1	18	4.1
connotea	16	122	47	0	11	17	7	8.7
copperminephotog	20	146	23	1	16	12	22	5.0
countmysql	1	3	0	1	1	1	3	4.0
cplinks	3	21	3	1	5	1	5	4.3
craftysyntax	30	300	30	1	35	5	32	4.4
crownevan	30	181	1	30	8	7	51	1.4
cruxcms	16	124	16	1	21	14	20	4.3
ctn	25	181	15	11	17	13	31	1.2
cubecart	29	209	15	16	15	18	32	2.7
cuteflow	17	151	25	1	12	8	17	5.2
dagger	28	261	29	3	38	15	87	4.0
dbmail	27	126	62	3	13	6	0	8.4
deadlock	4	24	6	1	5	2	4	4.5
dekiwiki	30	227	36	3	21	17	31	4.8
deluxebb	16	214	10	7	19	7	26	3.0
devana	24	165	24	3	30	12	26	1.8
dogarchive	11	94	12	1	8	12	12	4.8
dolibarr	160	1558	294	2	261	36	114	7.0
dominantcreature	11	101	9	3	12	21	24	3.7
dorcman	14	89	10	5	13	3	15	3.3
dotaos	3	15	3	1	2	7	4	5.4
dotclear	8	70	9	2	5	50	16	4.2
dotproject	60	426	59	13	24	55	65	4.5
dpsearch	27	110	10	20	21	6	33	2.0
drupal	40	226	41	7	20	24	6	5.8
dspam	5	24	6	1	6	1	5	4.7
dte	55	709	82	4	46	43	63	5.0
dvwa	2	9	2	1	3	2	2	4.3
e107	30	249	29	5	22	4	30	4.4
easybannerfree	1	13	2	0	1	2	3	8.6
easypoll	1	20	1	0	2	17	1	6.0
edcontainer	8	33	13	1	4	9	9	5.6
efront	77	569	74	4	59	54	87	4.9
eggblog	9	36	10	1	8	2	9	4.9
ehcp	13	85	14	1	11	11	19	4.7
ehs	18	130	21	3	13	12	12	2.2
ejabberd	11	64	10	3	5	9	7	5.6

elgg	34	194	38	1	36	3	41	4.7
emediacms	9	72	9	4	4	4	9	4.1
encapsgallery	4	38	3	2	4	3	4	4.4
entrans	7	31	7	1	6	5	7	4.7
epiware	466	3333	382	102	342	261	652	0.9
eqdkp	23	161	28	2	14	5	1	6.1
etomite	25	178	25	5	23	4	25	4.1
exponentcms	119	838	105	15	111	11	127	3.9
extcal	7	63	11	1	4	2	11	5.8
eyexcms	15	107	11	5	14	5	16	3.4
ezban	2	14	1	2	2	2	3	2.8
ezblog	2	14	2	1	4	2	2	3.3
ezmlmidx	14	55	4	11	3	3	24	2.6
ezpublish	108	723	108	4	90	36	113	4.8
familyproject	13	122	13	3	18	10	35	4.1
faqengine	51	486	34	18	41	2	51	3.4
faqman	4	20	6	2	0	1	0	6.3
faqmasterflex	2	6	2	1	3	2	3	4.3
flexphpsite	10	49	11	1	11	12	19	3.9
flossmole	5	31	5	1	1	15	6	5.4
formmail	2	10	2	1	2	1	0	5.5
fowlcms	8	49	8	1	11	1	10	4.3
freeglobes	18	85	18	1	16	16	23	4.7
freeradius	9	71	8	2	9	9	10	4.0
freeschool	28	185	37	1	41	18	10	6.1
freewps	20	100	20	1	20	2	20	4.6
fretswab	7	40	7	2	5	6	7	4.8
frontaccounting	62	487	80	3	39	27	35	2.8
gallery	45	187	36	13	29	58	3	1.0
gammu	9	75	7	3	6	6	13	4.2
gazie	38	606	38	2	41	23	46	4.6
gbs	2	6	2	1	3	1	2	4.5
gcards	7	32	8	1	6	2	8	5.0
geeklog	47	386	45	4	31	32	58	4.9
geneotree	19	160	13	7	9	16	25	3.7
genovaweb	3	14	8	0	1	2	0	9.1
gepi	72	541	65	9	38	72	12	5.7
glorylands	51	362	50	2	69	13	65	4.1
glpi	114	1064	135	1	125	129	134	4.3
gnokii	3	28	3	1	5	1	4	4.4
gooplecms	2	8	4	1	1	3	2	6.3
gpstrackerphp	1	14	1	0	1	2	0	7.6
greensd	11	137	16	1	10	8	13	5.1
groupe	123	894	103	24	76	189	137	3.7
groupofficecom	56	445	48	9	45	33	73	4.3
habari	28	132	35	1	18	18	30	5.3
horde	16	84	13	7	5	12	16	1.7
htcheck	9	84	9	1	7	15	14	4.7
humogen	13	219	10	4	17	3	14	2.4
icebb	44	355	37	8	46	9	54	3.9
idoc	3	24	3	1	4	1	5	4.5
igamingcms	28	139	29	1	33	4	33	4.4
impresscms	36	274	30	7	35	37	38	3.8
indimail	4	35	5	1	2	9	6	5.2
ipath	43	229	8	36	19	4	50	0.7
iphplog	2	29	2	1	2	5	2	5.0
ipplan	24	167	25	7	12	26	9	5.0
isql	4	7	2	3	4	5	4	1.9
itequipmentselec	9	52	7	3	1	20	13	4.4
itlpoll	5	42	4	2	9	2	16	3.7
jabberd	15	107	13	3	17	7	24	3.7
jabref	6	110	5	2	54	6	14	0.7
jffnms	50	350	86	1	34	7	72	5.7
joomla	36	321	35	5	35	15	45	4.3
jwhoisserver	7	57	25	0	1	14	3	9.5
kannel	1	9	0	1	2	3	2	2.5
khcoder	23	120	22	2	28	13	36	3.8
kissabe	4	14	3	2	2	3	1	5.0
knowledgeroot	10	79	11	1	11	3	11	4.6

knowledgetree	187	589	340	11	273	106	89	3.2
koha	72	675	46	29	75	50	90	2.6
kool	45	374	45	6	47	12	67	4.2
kvwmap	47	476	47	1	37	64	54	4.8
laconica	29	188	44	1	52	37	21	3.4
lifetype	26	209	28	1	25	7	30	4.8
lighttrack	3	35	4	1	3	3	4	5.6
lilblogs	10	56	10	1	11	4	12	4.7
limesurvey	20	158	22	2	15	19	3	6.0
linkupfree	5	42	4	2	6	10	8	3.6
livejournal	244	1088	257	25	133	195	295	2.5
livestreet	26	181	67	0	22	9	1	8.3
lovecms	6	32	6	1	7	1	7	4.5
mambo	38	316	38	4	42	11	43	4.3
mantis	29	232	32	2	21	45	31	0.0
mappyemailsignup	1	7	1	0	3	3	1	5.5
maxblog	8	52	6	3	7	4	9	3.6
mcguestbook	2	20	1	2	2	1	3	3.0
mediawiki	35	249	33	9	21	49	7	1.6
mercuryboard	18	139	19	1	17	4	18	4.7
miacms	41	345	42	4	46	11	46	4.4
microcms	5	25	5	1	6	1	5	4.5
minibb	6	58	6	1	7	2	6	4.4
mirrored	102	503	105	12	74	103	117	4.5
mlf	11	97	8	5	10	7	11	3.4
mnogosearch	14	98	8	9	9	8	20	2.9
modx	39	326	40	6	34	7	46	4.3
moodle	186	1584	229	1	207	16	10	5.8
mose	68	872	73	6	214	48	225	4.5
motion	1	6	0	1	1	2	1	3.8
movabletype	29	362	30	2	28	5	29	4.3
mrbs	6	65	6	1	8	2	7	4.4
multishop	43	277	42	4	34	11	44	4.7
mvnforum	20	231	27	2	7	11	20	5.5
mybb	49	510	44	6	61	9	57	4.0
mycart	7	51	5	3	9	4	8	3.4
mydms	22	112	25	1	19	28	24	0.5
mydns	2	17	4	1	3	3	5	5.0
mygb	2	10	2	1	3	5	3	4.1
myphpannuaire	7	58	10	2	5	2	10	4.8
myphpmoney	9	48	6	4	9	5	14	3.1
myreview	32	198	31	2	20	30	36	4.9
mysqlfs	3	16	3	1	5	2	5	4.5
mythtv	41	368	43	6	28	43	46	4.7
nagiosql	23	307	41	1	14	28	24	1.3
nanourl	1	2	1	0	1	3	3	8.4
ndoutils	59	705	106	2	16	5	1	6.9
neobill	30	216	30	1	28	17	40	4.7
netacct	1	11	1	0	2	2	1	6.9
netmrg	29	186	25	7	26	7	35	3.9
netrisk	15	120	9	8	16	4	18	3.1
newpki	24	131	28	2	24	16	31	4.3
nuclearbb	33	199	27	7	27	8	39	4.0
nucleus	20	110	27	5	3	16	22	5.0
oasis	28	281	18	13	32	11	41	3.1
obmui	112	1170	113	10	80	50	118	4.0
ocs	58	468	67	1	38	33	79	5.2
odminko	4	29	6	2	1	2	6	5.2
omegaannonces	13	51	13	1	10	7	18	5.1
onecms	45	336	45	1	54	10	76	4.4
oneorzero	23	160	31	3	15	5	26	5.0
openaudit	80	818	81	1	76	601	82	4.0
openauto	13	136	13	2	15	12	22	4.3
openclassified	5	42	7	0	7	3	0	7.2
openconf	17	104	17	1	9	21	19	5.4
opendb	47	276	52	1	16	79	55	5.4
opendocman	12	50	6	7	8	3	12	2.7
openemr	69	960	70	3	89	40	93	4.1
openfire	30	181	28	3	6	62	34	5.2

openmrs	72	618	255	1	77	92	7	7.8
openpne	98	697	119	1	103	108	111	4.6
openrealty	17	207	17	1	17	197	17	3.8
openser	43	358	61	2	34	34	55	5.1
opensurveypilot	84	475	81	4	84	44	84	4.0
openx	62	782	56	8	62	30	12	5.0
orangehrm	86	512	183	7	77	89	5	7.5
ortus	13	83	12	2	15	2	26	4.0
oscarcmaster	260	9725	227	44	377	296	413	0.0
oscommerce	47	314	44	4	38	104	48	4.3
osfm	1	32	0	1	1	2	1	3.6
ossim	120	548	108	18	42	183	133	4.7
ote	4	29	7	1	3	1	4	5.9
owl	26	332	22	7	22	13	29	3.7
oxygen	11	83	15	4	4	6	13	4.5
pabox	5	29	3	3	4	2	6	3.3
pabugs	6	44	9	1	4	2	6	5.3
pacercms	11	115	11	1	12	1	11	4.5
pafaq	7	70	6	2	7	1	7	4.1
pafiledb	10	94	9	2	10	3	11	4.1
paguest	4	28	4	1	9	2	7	3.0
panews	4	29	3	2	4	1	5	3.8
papoolight	84	641	65	20	54	46	85	4.2
passmasterflexpl	3	25	3	1	4	3	4	4.4
pdns	3	18	4	2	3	3	2	3.3
phoenixview	13	72	13	1	15	3	14	4.4
phorum	19	164	21	2	12	12	1	2.7
php4flicks	5	25	5	1	3	5	8	5.4
phpaddressbook	3	19	6	1	2	1	3	5.8
phpadvgenealogy	12	103	8	5	17	13	14	0.0
phpadvocat	15	97	13	3	17	3	21	3.0
phpagenda	7	34	7	1	5	6	8	5.3
phpbb	62	531	58	11	35	24	1	5.5
phpbms	23	244	23	1	28	11	27	3.2
phpbp2	35	314	33	4	48	20	60	4.3
phpbtracker	3	16	3	1	2	4	4	5.4
phpbtrkplus	10	88	10	1	6	12	11	5.2
phpcoin	45	498	47	2	41	11	45	4.6
phpcollab	27	309	27	1	32	5	32	4.2
phpcomasy	17	104	16	3	11	9	22	4.6
phpcommunitycale	12	91	13	3	10	2	13	4.2
phpdevshell	19	80	19	1	18	4	19	4.5
phpdj	8	39	6	3	7	4	11	3.7
phpeasydata	12	90	12	1	9	13	12	5.1
phpechocms	19	93	10	10	12	2	20	3.0
phpeppershop	20	251	35	3	13	28	28	4.8
phpesp	18	115	19	1	11	15	19	5.2
phpetition	13	130	12	2	18	15	16	3.7
phpfusion	38	318	32	7	34	2	38	4.0
phpgedview	6	57	6	1	7	3	6	3.7
phpgroupware	167	1181	168	19	150	74	203	4.4
phpinventory	7	55	7	1	8	2	7	4.4
phpirc	1	6	0	1	2	1	1	3.0
phplist	51	269	67	3	46	18	54	4.8
phpmyadmin	8	42	9	1	13	15	8	4.2
phpmybittorrent	27	229	39	3	14	14	35	5.4
phpmychat	16	250	14	4	17	7	22	3.9
phpmyfamily	8	59	8	1	7	4	10	4.8
phpmyfaq	30	159	32	2	18	34	36	5.2
phpmylibrary	23	163	44	1	11	5	36	5.9
phpmynewsletter	6	51	2	5	6	2	6	2.2
phpmypartenaire	6	31	6	1	7	1	10	4.5
phpmyprepaid	47	489	42	6	42	70	51	3.3
phpmysport	37	237	36	2	27	158	41	4.3
phpmytourney	7	24	11	1	3	4	7	5.8
phpnuke	95	795	77	22	87	20	25	4.8
phpope	49	396	51	5	29	73	57	4.7
phporganisation	44	387	39	8	43	19	48	3.9
phpppm	33	221	34	1	44	6	51	4.4

phpprofilelite	23	180	19	5	23	15	30	3.8
phprealtimestats	4	18	2	3	5	4	4	2.4
phpprpg	25	209	36	1	19	2	25	5.1
phpscheduleit	15	97	15	1	3	26	16	5.7
phpsge	21	136	14	9	17	5	36	3.3
phpshop	28	245	21	9	19	125	30	3.1
phpsimplechat	3	16	4	1	4	1	7	4.9
phpslash	35	160	44	3	20	17	39	4.9
phpstats	15	106	10	6	11	14	20	3.6
phptransformer	59	563	38	31	31	38	70	3.0
phpvideopro	22	131	29	1	21	14	29	5.0
phpwebgallery	30	164	35	1	15	20	37	5.5
phpwebnews	11	66	9	3	11	10	19	3.2
phpwebportail	18	111	21	2	23	12	30	4.2
phpwiki	10	49	9	4	5	14	14	4.1
phreebooks	40	386	42	2	55	21	33	1.9
piwigo	29	158	34	1	19	20	34	5.4
piwik	17	136	18	1	12	14	20	5.1
pixelpost	9	88	9	1	10	8	12	4.3
pixiecms	10	105	14	1	10	3	14	5.1
plans	4	15	0	5	2	5	5	0.0
plazma	275	3628	758	16	326	144	337	7.0
pligg	16	146	21	1	11	5	18	5.2
pmacct	1	19	1	0	1	9	2	5.8
pmailsvr	2	13	2	1	3	3	4	4.1
pmb	106	777	103	11	83	112	121	4.5
pmdb	1	16	1	0	2	1	1	7.0
pokernetwork	19	161	20	4	13	22	4	5.1
poplar	7	72	7	1	6	11	7	4.4
postnuke	34	317	31	4	34	4	35	4.2
prestashop	88	458	86	9	68	23	90	4.5
projectpier	27	245	34	2	20	16	4	2.7
prophp	3	16	2	2	3	2	3	3.4
punbb	17	135	16	2	16	7	22	4.6
qsf	2	8	1	2	1	3	2	3.6
qsgen	46	587	62	3	44	14	63	4.7
qregistrations	12	121	11	3	15	16	15	4.2
quartz	12	62	18	0	23	31	1	5.2
quicksilverforum	19	155	20	1	18	4	19	4.6
quicktalkforum	7	74	8	1	10	8	9	3.8
quicktalkguestbo	1	12	1	0	5	2	2	5.9
quickteam	10	80	8	3	9	11	12	4.0
quicket	8	92	8	2	14	9	11	4.1
radiant	9	63	11	2	5	3	1	5.6
rasmp	14	86	18	1	13	7	14	5.0
ratboxservices	15	70	15	1	3	22	17	5.5
rechnungszentral	4	47	4	1	13	2	20	2.9
redmine	47	327	46	3	50	5	8	5.3
reecalendar	5	36	6	1	4	5	6	5.3
refbase	16	240	16	1	20	13	23	3.9
refdb	18	462	19	2	20	5	20	3.2
riotpix	2	24	2	1	3	3	4	4.3
roller	33	272	59	1	37	37	3	7.2
roomphpplanning	5	34	5	1	6	1	5	4.5
roundcubemail	6	54	7	1	5	7	10	5.0
rsyslog	2	28	2	1	4	2	2	3.3
rt	21	241	24	2	21	29	4	1.4
satchmo	60	360	134	0	56	8	5	8.2
saturncms	4	12	4	1	6	1	5	4.2
saxon	4	31	5	1	4	1	5	5.0
sblog	12	67	12	1	12	10	16	4.5
sbnc	1	3	1	0	2	1	1	7.0
schoorbs	4	33	4	1	6	1	5	4.4
scoop	55	363	53	3	24	72	64	5.0
scuttle	4	25	5	1	4	1	7	5.0
securityscanner	2	11	2	1	2	6	2	5.0
segue	104	456	122	13	139	92	7	3.0
ser	24	195	22	5	10	61	30	4.3
serendipity	22	142	13	10	14	12	26	3.3

sharedtree	32	281	46	2	60	15	6	3.3
shoppingcart	2	10	2	1	3	2	5	4.4
shoutbox	3	12	2	2	3	2	3	3.4
shutter	5	34	4	2	5	2	5	3.7
silverstripe	54	413	56	1	59	8	57	4.3
simplecustomer	4	36	4	1	6	7	4	3.4
simpleticket	14	90	13	2	14	3	3	4.2
simtrain	71	752	134	11	103	14	44	2.8
sirv	19	118	4	16	7	6	31	2.0
sitebar	14	89	16	3	4	15	16	5.2
slash	44	322	51	2	38	25	56	5.0
slimcms	2	8	2	1	3	4	2	3.9
slxbbl	65	287	15	58	68	37	58	0.0
smartblog	7	29	7	1	8	2	8	4.3
smbaudit	3	14	3	1	3	3	4	4.8
smf	41	271	50	1	28	81	49	4.8
smi	13	97	13	1	16	4	13	4.0
snogs	5	40	5	1	6	3	6	4.3
snort	16	83	16	1	9	22	18	5.2
socialshare	4	26	9	0	1	6	4	9.1
solarcms	10	64	12	1	12	10	13	4.4
specter	1	77	1	0	4	1	1	4.0
sphider	25	105	6	21	6	2	29	1.9
spip	38	294	38	2	27	39	66	5.1
sqlfamilytree	51	264	51	2	52	24	64	4.4
sqlgrey	8	20	7	2	1	17	11	5.1
squirrelmail	2	9	2	1	1	7	2	5.3
srsv	31	171	34	2	14	56	46	5.2
st-course-mgt	12	56	11	2	8	11	13	4.7
streber	15	219	14	2	21	12	19	3.9
sugarcrm	97	1096	87	14	23	93	102	5.1
supercali	9	65	6	4	7	1	14	3.5
surrealtodo	5	30	5	1	5	2	7	4.8
sympa	5	51	5	1	2	21	5	3.8
tagadash	30	209	37	1	17	12	30	5.3
tahoe	11	109	11	1	4	22	53	5.3
tanal	3	18	3	1	4	6	5	4.5
tangocms	21	130	20	2	22	3	21	4.3
taskfreak	9	76	9	1	8	5	10	4.6
tavi	6	25	6	1	0	13	4	6.7
tbsource	21	185	26	1	17	7	29	5.0
tcw	9	46	14	1	9	4	17	5.4
techttables	8	39	7	2	2	10	8	5.1
testlink	35	181	42	3	23	12	36	5.1
textpattern	17	139	20	1	15	15	26	5.0
tgs	19	125	20	1	13	12	19	5.0
thales	5	139	8	1	3	7	9	5.5
tigase	6	20	9	2	6	1	1	6.5
tikiwiki	212	1636	215	8	158	248	264	4.6
timeclock	8	35	9	2	4	7	9	5.0
tmevolution	4	25	4	1	7	2	6	4.1
torrentflux	7	38	7	1	7	6	9	4.6
torrenttrader	29	251	35	1	32	12	37	4.7
trac	17	85	17	1	4	37	5	6.2
trcms	7	33	7	1	8	5	8	4.0
trilonis	2	32	2	1	2	5	4	4.7
truc	47	461	57	4	50	47	52	3.4
tryton	17	101	37	2	18	3	2	7.2
tsep	10	51	17	1	4	4	11	5.9
typo	18	109	14	5	17	4	3	3.7
typo3	19	224	19	2	14	25	17	2.2
ueberp	2	9	2	1	3	2	2	4.3
ulogd	1	42	1	0	4	1	2	4.0
uma	4	34	8	1	6	2	7	4.9
usebb	12	106	10	3	8	5	15	4.4
vanilla	14	114	12	3	7	9	2	5.7
videodb	12	66	13	1	4	15	18	5.4
vikingsboard	27	193	26	2	31	8	32	4.4
voipmonitor	1	82	1	0	2	3	1	5.2

vtigercrm	307	1386	419	68	369	150	118	2.7
vufind	7	39	15	0	8	2	3	7.9
vwar	71	706	76	11	67	11	82	4.3
wackowiki	8	73	7	3	6	5	11	4.2
webalbum	7	99	7	1	7	4	9	4.6
webcalendar	29	173	27	3	13	34	30	5.0
webedition	66	874	55	13	89	125	84	0.0
weberp	92	785	210	21	101	99	21	3.2
webid	50	414	16	35	31	9	59	2.3
webspell	53	462	45	9	67	38	77	3.7
websubrev	15	144	15	1	11	11	17	5.1
webtopliste	8	46	8	1	9	4	13	4.5
webtorrent	5	38	6	1	4	3	7	5.2
wfb2sql	6	33	6	1	1	15	8	5.4
wiclear	16	81	11	6	13	7	16	3.3
wikindx	35	178	33	3	35	6	38	4.1
wikka	7	32	5	3	4	4	8	4.0
wiklink	3	19	3	1	4	2	3	4.4
winventory	76	643	74	3	72	498	79	3.9
wordpress	10	88	12	1	7	7	10	5.1
wpquiz	12	75	12	1	13	3	13	4.4
wview	20	222	20	1	25	6	39	3.0
wzdftpd	6	39	8	1	2	11	11	5.5
x7chat	11	109	11	1	13	5	14	4.4
xaraya	43	279	51	3	37	6	43	4.8
xbtracker	7	41	6	3	5	1	10	3.9
xinco	23	135	25	1	18	8	23	4.9
xomol	32	244	26	9	16	27	32	4.2
xoops	31	227	25	7	27	37	33	3.8
xrms	66	566	63	5	66	38	70	3.6
yaap	20	161	21	1	25	4	25	4.4
zabbix	66	437	73	4	57	26	8	5.6
zcs	48	279	69	11	56	61	38	2.7
zencart	95	796	92	8	76	185	96	4.4
zenith	8	67	8	1	7	5	0	5.6
zipmasterflex	1	6	1	0	2	1	1	7.0
zomplog	11	131	11	1	17	4	14	4.3
zoneminder	16	308	16	2	18	9	18	4.6
zoph	16	154	16	1	13	11	20	4.9
zpaniqab	1	13	2	0	2	2	2	7.6

TABLE XI: PostgreSQL Projects Summary

Project Name	Size			Advice counts				Mark
	<i>Tab</i>	<i>Att</i>	<i>Cns</i>	<i>Err</i>	<i>War</i>	<i>Not</i>	<i>Inf</i>	
acid	4	25	6	1	7	3	0	5.2
adempiere	607	10979	2582	4	94	1570	63	7.8
andromeda	180	2135	0	181	31	117	16	0.7
asterisk	1	16	0	1	0	2	2	4.2
bacula	21	176	20	2	19	42	6	5.0
bandwidthd	5	47	1	5	2	4	16	2.0
base	6	34	8	1	11	3	0	5.4
bricolage	119	669	339	0	113	31	13	8.1
care2x	132	2055	118	15	144	102	15	4.9
comics	7	25	17	0	2	1	2	9.4
ctn	25	212	15	11	1	35	8	3.3
davical	30	184	65	11	31	39	6	5.9
dbmail	27	127	48	3	26	5	0	7.5
dspace	34	180	93	0	41	13	1	7.6
dspam	5	24	5	1	13	0	0	3.1
dvwa	2	9	2	1	2	1	0	5.3
ejabberd	11	64	7	6	13	9	7	4.9
elgg	33	190	36	1	40	1	7	5.3
evergreen	111	961	307	13	121	15	39	7.4
ezmlidx	16	71	7	10	5	12	10	3.8
ezpublish	108	723	105	4	90	35	5	5.8
facturascripts	8	32	8	1	4	10	2	6.3

faqengine	51	486	2	50	14	48	0	2.1
fossology	52	365	108	8	75	81	5	6.7
freeradius	9	73	8	2	12	8	1	4.8
freewps	20	100	20	1	19	1	0	5.6
gallery	43	185	31	13	24	20	1	4.9
gammu	9	75	7	3	5	7	4	5.1
gforge	132	1045	177	37	178	61	23	5.7
gnokii	2	18	2	1	2	0	1	5.5
gnugk	9	84	20	2	8	2	1	7.4
gnumed	193	2090	363	70	174	87	19	6.6
habari	26	126	33	1	15	17	2	6.4
horde	16	83	13	6	4	11	1	5.2
ipath	41	241	6	36	13	49	5	1.2
ipplan	24	167	15	10	17	25	9	4.1
jabberd	15	107	12	4	1	27	9	5.6
jffnms	50	350	50	1	123	6	22	3.0
jwhoisserver	6	49	19	0	3	10	3	8.8
kannel	1	9	0	1	1	3	1	3.1
knowledgeroot	6	44	15	0	7	2	1	7.0
kvwmap	118	646	87	33	180	171	54	5.2
laconica	25	167	62	0	25	32	16	8.2
ledgersmb	50	431	61	0	113	53	24	4.5
limesurvey	20	158	17	4	12	21	3	5.4
maarchenterprise	62	1262	58	5	81	73	0	5.2
mediawiki	36	265	46	18	31	30	3	5.7
metricsanalyzer	2	5	4	1	0	3	2	7.0
modserv	18	95	0	19	1	20	4	2.0
motion	1	6	0	1	1	1	0	3.6
mrbs	6	65	6	1	7	2	0	5.2
musicbrainz	69	457	162	0	80	14	11	7.4
mvnforum	20	231	27	2	6	10	0	6.5
nurpawiki	6	19	9	14	3	3	0	0.0
obmui	112	1171	99	21	73	1042	6	4.3
openclinica	68	549	175	133	120	67	2	0.0
openfire	30	181	29	2	33	60	4	6.8
openpne	98	697	119	1	101	107	13	5.6
openrealty	17	208	17	1	16	197	0	4.8
openser	43	358	63	2	34	34	12	6.1
ossim	69	317	67	3	28	106	10	6.2
owl	26	332	17	10	20	18	3	4.0
pdns	3	18	3	1	3	3	1	6.0
pentabarf	247	1284	224	158	287	298	28	4.0
phpadvocat	15	95	16	4	22	6	6	4.8
phpcollab	27	309	27	1	32	3	5	4.4
phpesp	16	99	16	1	9	13	1	6.2
phpgedview	6	57	6	1	6	2	0	4.7
phpgroupware	167	1181	168	19	151	91	36	5.3
phpmyfaq	30	159	29	2	17	34	6	6.1
phpmynewsletter	6	51	2	5	4	5	0	3.0
phpsimplechat	3	16	4	1	3	0	4	5.9
phpvideopro	22	131	28	1	24	14	6	5.7
phpwebnews	11	66	9	3	9	11	7	4.2
plazma	273	3626	753	14	329	156	336	6.8
pmacct	2	21	2	1	1	7	2	5.1
postbooks	240	3660	583	8	336	2873	26	6.4
postnuke	34	317	31	4	32	3	1	5.2
projectnet	11	40	23	0	1	14	2	9.3
qtregistrations	12	121	11	3	15	17	3	5.1
quartz	12	62	18	0	23	30	1	5.2
quicktalkforum	7	74	8	1	9	7	2	4.8
quicktalkguestbo	1	12	1	0	4	1	1	6.9
quickteam	10	80	8	3	8	12	2	4.9
quicket	8	92	8	2	14	9	3	5.0
rasmp	14	86	14	1	12	6	0	5.8
ratboxservices	15	70	19	0	14	21	2	7.4
redmine	47	327	41	7	47	4	8	5.0
refdb	18	462	19	2	19	4	2	4.3
roller	33	272	59	1	38	35	3	7.1
rsyslog	2	28	2	1	3	1	0	4.3

rt	21	241	21	1	22	5	3	5.3
scalix	4	37	3	2	2	7	0	4.3
schoorbs	4	33	4	1	5	0	1	5.4
segue	90	382	164	12	79	83	6	7.3
sisu	6	118	14	1	7	6	9	6.3
slash	32	214	40	1	27	27	9	6.2
slxbbl	65	287	22	54	66	97	0	2.2
smbaudit	3	14	3	1	3	2	1	5.5
snort	16	83	16	1	9	21	2	6.1
specter	1	78	0	1	2	1	0	1.6
sqlgrey	8	20	7	2	0	16	3	6.1
sqlledger	52	482	8	45	67	55	31	2.0
squirrelmail	2	9	2	1	0	6	0	6.3
studs	4	19	2	3	2	3	1	3.2
tagadash	24	174	30	1	14	7	0	6.2
tanal	3	18	5	0	2	5	2	8.2
tehtables	8	39	21	1	15	9	0	4.5
testlink	35	181	40	3	34	11	1	5.7
testmaster	12	62	22	8	8	14	0	4.7
tigase	6	20	6	3	6	2	1	5.4
tikiwiki	212	1636	216	7	381	250	52	6.0
tinyerp	31	199	72	5	34	7	4	6.8
torrentflux	7	38	7	1	6	3	2	5.7
tryton	17	103	40	0	21	1	3	7.7
ueberp	33	258	0	34	6	0	1	2.2
ulogd	1	45	0	1	2	1	1	1.6
uma	5	42	8	1	4	9	3	6.6
urdabrunn	15	78	31	3	10	3	2	7.7
vtigercrm	247	1326	387	7	335	80	9	6.9
webcalendar	29	173	27	3	12	35	1	5.9
wfb2sql	6	33	13	0	0	14	2	8.9
wview	20	222	20	1	24	3	19	4.2
wzdftpd	6	39	14	0	1	9	5	9.0
xinco	23	134	39	0	29	8	0	7.4
zabbix	66	437	63	4	68	25	8	5.3