Data set use in this study:

1. Sources:

GHTorrent data set: http://ghtorrent.org/

Google Code: googlecodeprojs.txt

2. Android Filtering:

1.Mongo query to extract Java issues:

```
select u.login, p.name, i.issue_id, count(*) as
watchers
from users u, projects p, issues i, watchers w
where i.repo_id = p.id
and u.id = p.owner_id
and p.language='Java'
and p.forked_from is null
and i.pull_request_id is null
and p.id = w.repo_id
group by u.login, p.name, i.issue_id
order by login, name, issue_id, watchers;
```

2. Tools Used:

1. Design Wizard -
    https://sites.google.com/site/designwizardhomepage/
2. MongoDB - http://docs.mongodb.org/
3. PostgreSQL

3. Tools Developed:

Exception Miner tool (*still under development* to be available in GITHub)

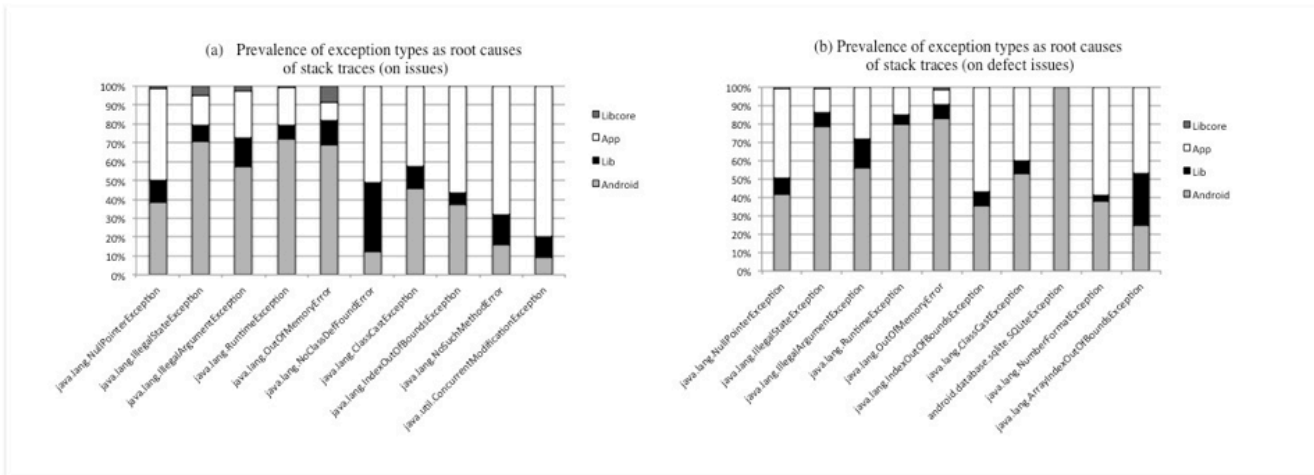## *4. Findings related to Issues x Defect Issues:*

Fig. 1: Prevalence of exception types on issues in general (a) and defect issues (b).

4. Classification of top 100 exceptions:

1. Exceptions relaed to backward compatibility:
   - `InstantiationError`
   - `VerifyError`
   - `IllegalAccessError`
   - `ClassCircularityError`
   - `NoSuchFieldError`
   - `IncompatibleClassChangeError`
   - `NoSuchMethodError`
   - `AbstractMethodError`
   - `NoClassDefFoundError`
   - `java.lang.LinkageError`
   - `java.lang.UnsatisfiedLinkError`

2. Exceptions related to Java reflection:
   - `java.lang.ReflectiveOperationException`
   - `ClassNotFoundException,`
   - `IllegalAccessException,`
   - `InstantiationException,`
   - `InvocationTargetException,`
   - `NoSuchFieldException`
   - `NoSuchMethodException`

3. Categories:

🟨	resources
🟩	security
🟦	concorrency
🟦	backward compatibility
🟦	Reflection
🟧	specific (GUI,FRAMEWORK)
🟪	General (Error, Exception, Runtime)
🟧	Programing mistake

4. Top 100 classification:

1	java.lang.NullPointerException
2	java.lang.IllegalArgumentException
3	java.lang.ClassNotFoundException
4	java.lang.IllegalStateException
5	java.lang.RuntimeException
6	java.lang.ClassCastException
7	java.lang.NoSuchMethodError
8	java.lang.ArrayIndexOutOfBoundsException
9	java.io.IOException
10	java.lang.NoClassDefFoundError
11	java.lang.OutOfMemoryError
12	java.lang.IndexOutOfBoundsException
13	java.util.ConcurrentModificationException
14	java.io.FileNotFoundException
15	java.lang.NumberFormatException
16	java.lang.AssertionError
17	java.lang.StackOverflowError
18	java.lang.UnsupportedOperationException
19	java.lang.StringIndexOutOfBoundsException
20	java.net.SocketException
21	java.net.ConnectException
22	java.lang.UnsatisfiedLinkError
23	java.lang.NoSuchFieldError
24	java.lang.UnsupportedClassVersionError
25	Error
26	java.util.NoSuchElementException
27	java.io.EOFException
28	java.lang.reflect.InvocationTargetException
29	java.lang.VerifyError

30	java.sql.SQLException
31	java.net.UnknownHostException
32	Exception
33	java.lang.NoSuchMethodException
34	java.lang.IncompatibleClassChangeError
35	org.xml.sax.SAXParseException
36	java.lang.SecurityException
37	java.lang.AbstractMethodError
38	java.net.SocketTimeoutException
39	javax.ws.rs.WebApplicationException
40	java.util.zip.ZipException
41	java.lang.InterruptedException
42	org.bukkit.event.EventException
43	org.apache.catalina.valves.Error
44	java.lang.Exception
45	android.database.sqlite.SQLiteException
46	java.lang.IllegalAccessError
47	java.util.concurrent.RejectedExecutionException
48	java.lang.ArithmeticException
49	libcore.io.ErrnoException
50	java.net.BindException
51	java.lang.ExceptionInInitializerError
52	java.lang.InstantiationException
53	java.lang.NegativeArraySizeException
54	android.content.ActivityNotFoundException
55	android.content.res.ResourcesdNotFoundException
56	org.json.JSONException
57	java.lang.NoSuchFieldException
58	org.eclipse.swt.SWTException
59	javax.net.ssl.SSLException
60	java.io.NotSerializableException
61	com.fasterxml.jackson.databind.JsonMappingException
62	java.util.MissingResourceException
63	java.net.MalformedURLException
64	android.os.NetworkOnMainThreadException
65	java.lang.IllegalAccessException
66	org.springframework.beans.factory.BeanCreationException
67	java.net.URISyntaxException
68	java.nio.channels.ClosedChannelException
69	org.bukkit.plugin.UnknownDependencyException
70	com.mysql.jdbc.exceptions.jdbc4.MySQLSyntaxErrorException
71	com.mysql.jdbc.exceptions.jdbc4.MySQLIntegrityConstraintViolationException
72	java.util.concurrent.TimeoutException
73	java.lang.LinkageError
74	java.security.AccessControlException
75	java.lang.ClassFormatError

76	org.postgresql.util.PSQLException
77	org.eclipse.core.runtime.AssertionFailedException
78	org.osgi.framework.BundleException
79	java.lang.Error
80	java.nio.BufferUnderflowException
81	org.apache.maven.plugin.MojoExecutionException
82	java.util.concurrent.ExecutionException
83	org.eclipse.core.internal.resources.ResourceException
84	javax.servlet.ServletException
85	java.util.UnknownFormatConversionException
86	org.eclipse.core.runtime.CoreException
87	org.bukkit.plugin.IllegalPluginAccessException
88	javax.persistence.PersistenceException
89	java.lang.IllegalMonitorStateException
90	com.google.gson.JsonSyntaxException
91	java.text.ParseException
92	cpw.mods.fml.common.LoaderException
93	NullPointerException
94	org.bukkit.command.CommandException
95	com.google.inject.internal.Error
96	android.view.InflateException
97	android.os.DeadObjectException
98	org.codehaus.jackson.map.JsonMappingException
99	java.security.cert.CertificateException
100	javax.net.ssl.SSLPeerUnverifiedException
101	sun.security.provider.certpath.SunCertPathBuilderException
103	com.mongodb.MongoException
104	android.database.sqlite.SQLiteConstraintException
105	java.nio.channels.CancelledKeyException
106	javax.net.ssl.SSLHandshakeException

Additional Results of Manual Inspections:

1. List of exception signalers inspected (signalers.csv)

2. List of exceptions found (root_exceptions.csv)