Appendix B. Experiment Results

Bamboo	BasicArlo-Bamboo--Monday, July 22, 2024-11/31/18PM	BasicArlo-Bamboo--Monday, July 22, 2024-11/49/44PM	Total Req: 374 Requirements with conditions: 84 ASR Count: 94 Clustering Time: 7,079 Extracting condition groups: 584,504 ~ 10 min
Matrix	Unbalanced	Balanced	
Concurrent Condition Group	1	1	

Conditions	under any circumstances when you perform a CVS action running on remote agents If concurrent builds are on When using a windows machine and Git as repository	under any circumstances when you perform a CVS action running on remote agents After installing bamboo using the 2.5 M2 windows installer if run after the initial install if run as single thread When you install a JDK on windows when doing an import either via the setup wizard After a failure during code checkout/fetch it's possible that moving artifact files will run out of disk space in the middle whenever a git ssh URL is entered without a username When upgrading to the new Atlassian Plaform If concurrent builds are on If the Global Anonymous Permission to *Access* is disabled when the user manually deletes the cache directory between change collection & source checkout. on windows agents during the checkout phase when chain execution is started when chain executions stopped if latest executed plan stopped on manual stage If stage or job meant to be executed has been removed from plan or If plan structure (stages, jobs) has been changed When the JIRA UI polls bamboo If a Bamboo 3.1.1 instance is shutdown and then a 2.6.2 is run pointing to the 3.1.1 Home-Dir If more than one Task creates test results in a Job Constantly running out of diskspace on the server Retaining the content of atlassian-bundled-plugins.zip in memory When running the agent as a user Currently, if Bamboo integrated with LDAP using the atlassian-user.xml with the LDAP repository cache is set to false example shown below	

		When the repository changes to a repository that does not contain the same branches or does not support Plan Branches at all In any circumstance where gmail actually rewrites the email content e.g. to distribute to group members When we have merge conflicts When using a windows machine and Git as repository when there's a lot of data When you click re-run this build	
Disired QA	[Maintainability, 16],[Usability, 15],[Reliability, 13],[Security, 9],[Performance Efficiency, 8],[Compatibility, 7],[Portability, 4],[Cost Efficiency, 2]	[Reliability, 26],[Maintainability, 22],[Usability, 21],[Performance Efficiency, 16],[Security, 12],[Compatibility, 10],[Portability, 7],[Cost Efficiency, 2]	
Deployment	Microservices	Monolith	
Data Caching	Offline First	Offline First	
Communication	Message-Based	API-Call	
Data Replication	Hot-Cold	Hot-Cold	
Database Management	SQL	NoSQL	
Security	Proactive	Proactive	
Data Synchronization	Batch Processing	Batch Processing	

AIS Stats	1: 997 19: 47 4: 43 42: 10 5: 16 3: 42 13: 8 9: 8 6: 21 34: 6 20: 2 37: 1 7: 1	7: 5 15: 3 5: 5 10: 7 6: 6 3: 37 8: 3	

Instesting Case	**Why is R127 an AIR?** Removing requirement R127, which addresses reliability and cost efficiency, results in a shift from an 'offline-first' data caching approach to an 'always-on' approach. Here's a summary of R127: R127 requires removing storage instances not connected to Bamboo, thus enhancing cost efficiency by reducing extra storage costs and ensuring reliability by avoiding the use of outdated data. ARLO's decision to choose 'always-on' can be explained as follows: In the original matrix, 'always-on' is less cost-efficient but equally reliable compared to 'offline-first.' By removing R127, the emphasis on cost efficiency and reliability is reduced. Thus, while both strategies are equal in terms of reliability, 'always-on' being less cost-effective is more		

	preferred, given the reduced weight on cost, which was initially the reason for preferring 'offline-first.' R127: Reports indicate that Bamboo sometimes leaves 'orphaned' elastic instances and detached EBS volumes. Add functionality to allow admins to view and shut down instances not currently connected to Bamboo.		
	Data Caching: Offline First -> Always On	Deployment: Monolith -> Peer-to-Peer	
	R127: [Reliability,Cost Efficiency]	R338: [Security,Maintainability] R360: [Security,Reliability] R218: [Security,Usability] R266: [Security,Usability] R298: [Security]	
	R374: [Performance Efficiency,Cost Efficiency]	Data Replication: Hot-Cold -> Hot-Hot Data Synch: Batch Processing -> Real-time Sync	
	R51: [Performance Efficiency]	R259: [Usability,Reliability] R372: [Usability] R30: [Maintainability,Reliability] R55: [Reliability] R139: [Reliability] R174: [Reliability]	
	R82: [Performance Efficiency]	Batch Processing -> Real-time Sync	

	R92: [Performance Efficiency]	R188: [Maintainability,Reliability] R220: [Reliability] R273: [Reliability]	
	R144: [Performance Efficiency]	Batch Processing -> Real-time Sync	
	R176: [Performance Efficiency]	R300: [Reliability] R323: [Reliability] R49: [Reliability]	
	R184: [Performance Efficiency,Maintainability]		
	R348: [Performance Efficiency,Compatibility]		
	R214: [Performance Efficiency]		
	R36: [Reliability,Portability]		
	R309: [Portability]		
	R330: [Portability,Maintainability]		
	R5: [Portability]		
	R339: [Compatibility,Portability]		
	R32: [Usability]		
	R38: [Usability]		
	R80: [Usability]		
	Hot-Cold -> Central		

AIS19	R105: [Usability,Security] R170: [Usability] R173: [Usability] R189: [Usability] R236: [Usability] R238: [Usability] R249: [Usability,Maintainability] R257: [Usability] R290: [Usability] R319: [Usability,Maintainability] R333: [Usability,Maintainability] R1: [Reliability,Usability] R30: [Maintainability,Reliability] R55: [Reliability] R139: [Reliability] R174: [Reliability] R188: [Maintainability,Reliability] R220: [Reliability] R273: [Reliability]		
Transition	Batch Processing -> Real-time Sync		
AIS20	R360: [Security,Reliability] R14: [Maintainability] R35: [Maintainability] R113: [Maintainability]		

Aptana	Total Req: 771 Requirements with conditions: 231 ASR Count: 186 Clustering Time: 2994 Cluster Count: 9 Clusters (4, 11, 10, 8, 8, 13, 18, 7, 1) Condition Groups Count: 76 Extracting condition groups: 252914 mS ~ 4 min Satisfiable Groups Count: 44 Extracting satisfiable groups: 15660 = 15 sec			
File	BasicArlo-Aptana--Tuesday, July 23, 2024-10/37/57PM	BasicArlo-Aptana--Wednesday, July 24, 2024-4/18/59PM		
Matrix	Unbalanced	Balanced	Balanced	
Concurrent Condition Group	1	1	2	4

Conditions	under any circumstances If a user unchecks the 'use default location' checkbox	under any circumstances If a user unchecks the 'use default location' checkbox when a file needs updating If i work with a lot of FTP connections, after some hours when switching between files if I use "Save", Aptana actually upload file on save during large builds when files change inside a git connected project If you create a new project and you point to a location which already contains files If a user edits the filters on a participant or modifies enablement for minified JS files on file-download from ftp-remote-site if the scope is anything other than 'current file' when items in project build paths should be handled When a user creates a project from the dashboard Open a css file with 1000 lines, Enable word wrap, Scroll to bottom of page, Start typing when adding ext-debug-all.js into the project during the update via Aptana FTP client when making performance	under any circumstances On terminal windows with a long history of output without the appropriate Ruby Gem installed when the actual text execution appears to take less than 9 minutes when you are in a file of a related project when annotations in the side bar come up when typing quickly if they've chosen to debug with Firefox at startup during JS inferencing If you transfer a lot of files from an ftp server into a project when you go on to add height and width attribute when you right click on the project explorer window in aptana Upon Studio restart when working with any existing App or large Framework When user switches studio to a specific perspective when opening in Aptana Studio 3.1.2 with Mac OS X When the find bar has focus,	

		improvements on the partitioning when i downloaded and installed Aptana Studio 3.6 when an Ruby on rails application is launched, and any file is opened for editing	and the user inputs CTRL+ENTER/CMD+ENTER When the terminal screen is filled up after typing commands and the output goes passed the bottom when this textarea (Steps to Reproduce) gets filled too far (vertically or horizontally) during the startup during the project creation process while indexing file every time I needed to switch workspaces when launching Django with Aptana Studio, still not fixed on my system	
Disired QA	[Maintainability, 42],[Usability, 36],[Performance Efficiency, 32],[Portability, 7],[Reliability, 6],[Compatibility, 4],[Cost Efficiency, 3],[Security, 1]	[Maintainability, 46],[Usability, 41],[Performance Efficiency, 41],[Reliability, 11],[Compatibility, 8],[Portability, 8],[Cost Efficiency, 3],[Security, 2],[performance efficiency, 1]	[Usability, 45],[Maintainability, 43],[Performance Efficiency, 40],[Reliability, 16],[Compatibility, 7],[Portability, 7],[Cost Efficiency, 3],[Security, 1]	
Deployment	Microservices	Monolith	Monolith	
Data Caching	Offline First	Offline First	Offline First	
Communication	Message-Based	API-Call	API-Call	
Data Replication	Central	Hot-Cold	Hot-Cold	
Database Management	SQL	SQL	NoSQL	

Security	Proactive	Proactive	Reactive	
Data Synchronization	Real-time Sync	Real-time Sync	Real-time Sync	
AIS Stats		7: 7 11: 4 15: 4 14: 3 3: 7 1: 332 2: 8 8: 1 6: 1 10: 1		
Instesting Case		**Why is R437 an AIR?** **Removing requirement R437, which addresses portability and maintainability, results in a shift from using SQL for DBMS to NoSQL.** **R437 recommends a way to allow Aptana to run outside of Eclipse, enhancing portability by decoupling it from Eclipse, and improving maintainability by making it easier to run and debug from the command line.** **Removing R437 causes a transition to NoSQL because, in the balanced matrix, both SQL and NoSQL are equally**		

		preferred for portability, but SQL is more preferred for maintainability. With R437 removed, the emphasis on both portability and maintainability is reduced. Therefore, there is less emphasis on maintainability, making NoSQL a viable option. While R437 aims to improve code maintainability, ARLO assumes this applies to the entire software, including the database, and chooses NoSQL to adjust maintainability accordingly.		
AIS 1	Database Management: SQL -> NoSQL	Database Management: SQL -> NoSQL	Security: Proactive -> Reactive	
	R626: [Maintainability] R627: [Maintainability,Usability] R649: [Maintainability] R670: [Maintainability] R702: [Maintainability] R722: [Maintainability] R723: [Maintainability] R724: [Maintainability]	R437: [Portability,Maintainability]	R138: [Reliability] R305: [Reliability] R435: [Reliability,Security,Maintainability]	
	R395: [Maintainability] R418: [Maintainability] R419: [Maintainability] R477: [Maintainability] R478: [Maintainability] R479: [Maintainability] R480: [Maintainability]	R438: [Portability,Maintainability]	Database Management: SQL -> NoSQL	

	R617: [Maintainability]			
	R626: [Maintainability] R627: [Maintainability,Usability] R649: [Maintainability] R670: [Maintainability] R702: [Maintainability] R722: [Maintainability] R723: [Maintainability] R724: [Maintainability]	R718: [Compatibility,Portability] R88: [Compatibility]	R437: [Portability,Maintainability]	
		R282: [Compatibility,Usability] R525: [Compatibility]	R438: [Portability,Maintainability]	
		R645: [Maintainability,Compatibility]	R718: [Compatibility,Portability] R88: [Compatibility]	
		R648: [Compatibility,Usability] R36: [Maintainability] R54: [Maintainability]	R282: [Compatibility,Usability] R525: [Compatibility]	
		R58: [Maintainability]	R645: [Maintainability,Compatibility]	
		R65: [Usability,Maintainability]	...	
		R215: [Maintainability]		
		R247: [Maintainability]		
		R341: [Usability,Maintainability]		
		...		

SpringXD	# Requirements: 3056 Requirements with conditions: 728 # ASR: 969 Parsing Requirements: 0 Clustering Time: 81690 Cluster Count: 37 Condition Groups Count: 305 Extracting condition groups: 1151010 ~ 20 min Satisfiable Groups Count: 12 Extracting satisfiable groups: 38599	BasicArlo-SpringXd--Friday, July 26, 2024-11/42/13AM
Satifiable Group	1	2

Conditions	under any circumstances When there is support for boostrapping a http server in the reactor project we want spring-xd to support interactions through a UI Special Case File When an XD job is destroyed/deleted The XD build breaks with Gradle 1.8 due to some changes in dependency resolution if the /data directory isn't there When exporting of MBeans are enabled via XD_JMX_ENABLED Or running from your laptop to ec2 After the container/singlenode is up and running when a deployment fails on a container due to a misconfiguration HDFS sink needs to have unique identifier If the active name node fails In the UI when creating a definition from an existing Module upon ZK `onDisconnect` child event When the admin, container and singlenode servers start when creation of the test file on the remote machine fails from time to time Send 1M messages and increase or decrease so that a given test iteration takes about 2 minutes when the network is back up runtime running as singlenode when all message bus implementations are removed from the runtime classpath when xd-admin and xd-container are started as system services An environment should be provisioned to support the containers, Zookeeper and Kafka deploy/undeploy request received by REST API	

	When the user would like to be able to configure the logging directory When updating XD to 4.2.0.RC1 for low latency use-cases every minute	
Disired QA	[Maintainability, 245],[Usability, 201],[Performance Efficiency, 143],[Reliability, 99],[Portability, 82],[Compatibility, 71],[Security, 54],[Cost Efficiency, 9]	
Deployment	Monolith	
Data Caching	Offline First	
Communication	API-Call	
Data Replication	Hot-Cold	
Database Management	SQL	
Security	Proactive	
Data Synchronization	Real-time Sync	

AIS Stats	AIS of 46: 18 AIS of 16: 28 AIS of 77: 3 AIS of 25: 5 AIS of 28: 14 AIS of 21: 20 AIS of 22: 15 AIS of 26: 6 AIS of 23: 19 AIS of 67: 3 AIS of 29: 20 AIS of 71: 2 AIS of 43: 3 AIS of 79: 1 AIS of 53: 1 AIS of 68: 4 AIS of 15: 8 AIS of 98: 1 AIS of 42: 3 AIS of 80: 2 AIS of 58: 1 AIS of 70: 1 AIS of 92: 1 AIS of 27: 1 AIS of 30: 2 AIS of 47: 1 AIS of 96: 1 AIS of 32: 1 AIS of 69: 4 AIS of 19: 1 AIS of 55: 1 AIS of 45: 1 AIS of 64: 1 AIS of 81: 1	

	AIS of 20: 1 AIS of 63: 1 AIS of 51: 1 AIS of 89: 1 AIS of 60: 1 AIS of 44: 1 AIS of 93: 1	
Explanation on why AIR set is large	The large weights of QAs (e.g., 254 for Maintainability) makes it difficult to differentiate the impact of removing just one or a few requirements. The smallest AIR set contains 15 requirements (1% of the total ASRs), which is sufficient to drive a transition.	