PRESENTS

Dapr security audit

In collaboration with the Dapr maintainers, Open Source Technology Improvement Fund and The Linux Foundation

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Executive summary

In May and June 2023, Ada Logics carried out a security audit for the Dapr project. The high-level goal was to complete a holistic audit drawing on several different security disciplines. The audit was split into the following goals:

1. Formalise a threat model of the code assets in scope.
2. Do a manual code audit of the code assets in scope.
3. Evaluate Daprs fuzzing suite against the formalised threat model.
4. Perform a SLSA review of Dapr.

Our overall assessment of Dapr is highly positive. Dapr follows security best practices in both design and implementation. Dapr performed well in this audit demonstrating a strong security posture.

The audit found 7 issues, of which 4 are umbrella issues covering multiple cases of similar issues across different components in the same Dapr building blocks. None of the issues were of critical or high severity. We found a vulnerability in a 3rd-party dependency which was assigned a CVE[1] of high severity, however it did not impact Dapr in a critical or high severity manner, and affects only a small group of Dapr users in a component that is not enabled by default. The vulnerability had the potential to crash a Dapr sidecar with an out-of-memory denial of service attack vector. We found the vulnerability after performing the threat modelling goal and understanding the flow of untrusted data through a Dapr deployment, and then adding a fuzzer for the affected component.

We added a total of five fuzzers to Daprs OSS-Fuzz integration. These will continue to run continuously after the conclusion of the audit.

An area for future work on Daprs security posture is its software supply-chain. The SLSA review showed that Dapr is lacking a compliant provenance attestation alongside release artifacts but performs well with regards to its build and maintenance processes. We have included recommendations on generating provenance with releases using SLSA-provided builders. We also included recommendations on how Dapr can ensure the quality and integrity of its own supply-chain via its dependency tree.

[1] CVE-2023-37475

Results summarised
7 security issues found
All issues except for 1 have been fixed
Five fuzzers added to Daprs fuzzing suite
1 CVE assigned
Threat model included in report
SLSA compliance review included in report
Supply-chain threat mitigation advice included in report

Project Summary

The auditors of Ada Logics were:

Name	Title	Email
Adam Korczynski	Security Engineer, Ada Logics	Adam@adalogics.com
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The Dapr community members involved in audit were:

Name	Title	Email
Yaron Schneider	Maintainer and steering committee member	yaron@diagrid.io
Alessandro Segala	Dapr maintainer	asegala@microsoft.com
Artur Souza	Dapr maintainer	artur@diagrid.io
Bernd Verst	Dapr maintainer	bernd.verst@microsoft.com

The following facilitators of OSTIF were engaged in the audit:

Name	Title	Email

Derek Zimmer	Executive Director, OSTIF	Derek@ostif.org
Amir Montazery	Managing Director, OSTIF	Amir@ostif.org

Audit Scope

The following assets were in scope of the audit.

Repository	https://github.com/dapr/dapr
Language	Go

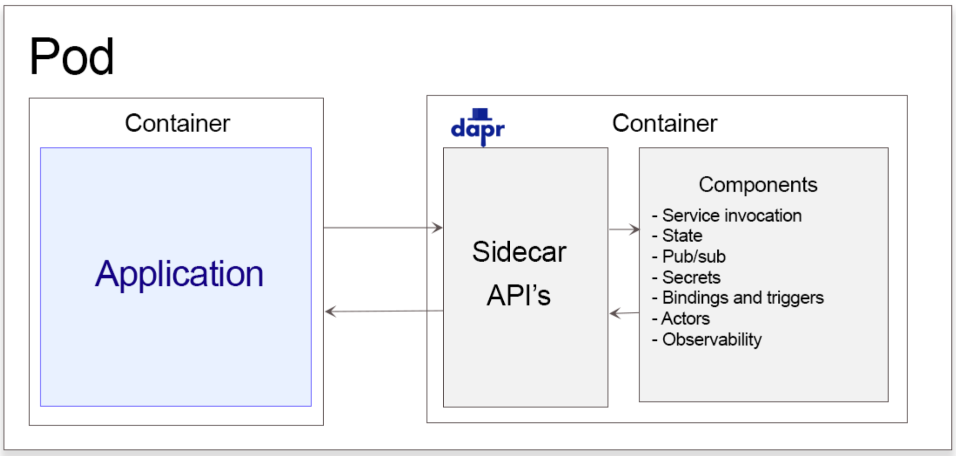
Repository	https://github.com/dapr/components-contrib
Language	Go

Repository	https://github.com/dapr/kit
Language	Go

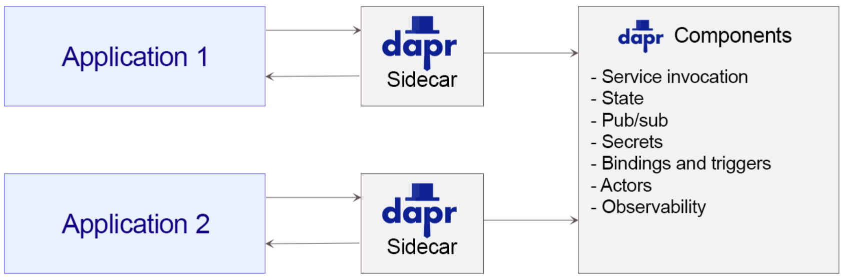
Threat model

Dapr is a framework for building cloud-native applications. It consists of a runtime and a set of building blocks that allow users to move infrastructure-related tasks out of their applications into cloud infrastructure. A benefit of this is that users can spend time and resources on the value-proposition of their applications without having to develop infrastructure.

Users can deploy Dapr either in 1) self-hosted mode directly on a virtual machine or 2) on Kubernetes. When using Dapr with Kubernetes, Dapr is deployed as a sidecar container in the same pod as the user's application. When running Dapr on a virtual machine, Dapr runs as a separate sidecar process. In both cases, the application and Dapr interact through HTTP or gRPC calls:



If the user has multiple applications running with Dapr, each has a sidecar next to it:

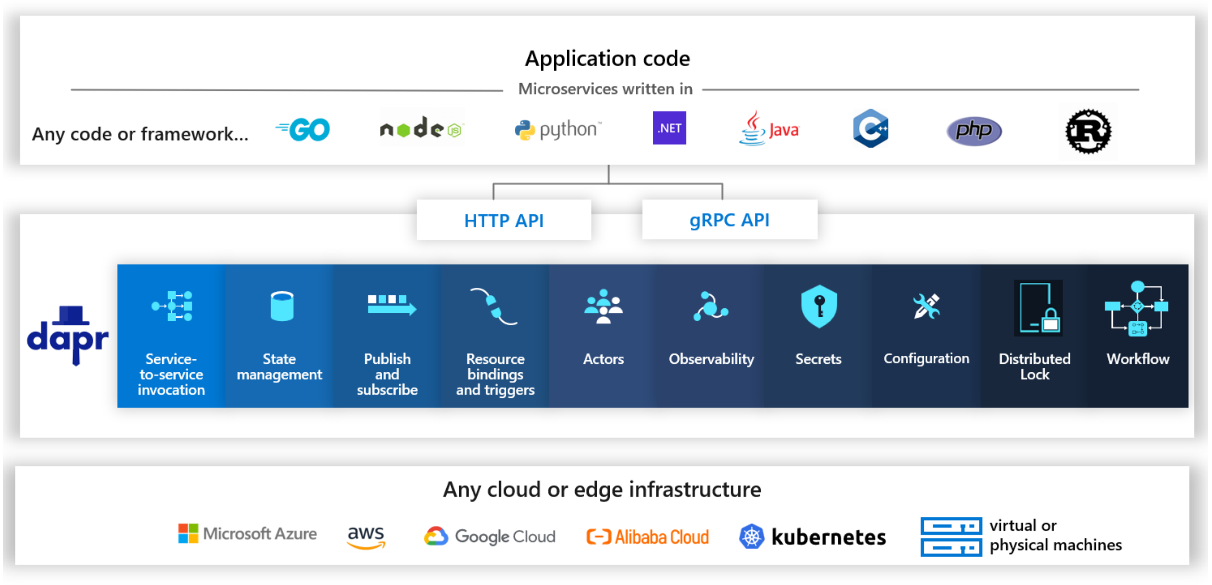


Dapr comes with a set of built-in components - a form of cloud-native primitives - that each enables common infrastructure-related functionality necessary when building microservice-based applications. The user application interacts with these components via HTTP or gRPC API endpoints. Dapr groups components into building blocks; A building block is a high-level category of a common cloud-native problem, and it consists of a series of components that solve that problem in different ways. Dapr has ten building blocks:

#	Name	Description
1	Service-to-service invocation	A series of HTTP or gRPC endpoints for applications to communicate with each other.
2	State management	A key/value-based state and query API for managing information in long-running stateful services.
3	Publish and subscribe	A messaging platform to send (publish) messages to a topic. Subscribers subscribe to a topic to receive messages.
4	Bindings	A bi-directional connection to an external service.
5	Actors	An independent unit of computation.
6	Observability	A series of components for logging, tracing, monitoring, emission of metrics.
7	Secrets	For managing secrets.
8	Configuration	For retrieving application configurations from configuration stores.
9	Distributed Lock	An API used to lock a resource, so multiple instances of an application can access the resource with guaranteed consistency.
10	Workflows	Used to define long-running processes across multiple microservices.

Illustrated high-level overview

Having outlined the main parts of Dapr, the runtime and the components, we can look at a high-level view of Dapr:



At the top is the user's application. This is the application that the user deploys Dapr with. The application communicates with the Dapr sidecar via either HTTP or gRPC. The Dapr sidecar invokes the Dapr components which interact with cloud services which are illustrated at the very bottom of the diagram.

daprd

The Dapr sidecar process is called `daprd` and is implemented in `github.com/dapr/dapr/cmd/daprd`[2]. We now do a quick code walk through of how Dapr starts the runtime and sets up the HTTP and gRPC endpoints and the components. The purpose of this brief section is to map the high-level view from the previous section to the Dapr codebase.

The `daprd` `main` function has two main purposes: 1) To instantiate a new `DaprRuntime` and 2) start it. `DaprRuntime` is the service that the users application communicates with. `daprd` creates the `DaprRuntime` with a call to `github.com/dapr/dapr/pkg/runtime.FromFlags()`:

https://github.com/dapr/dapr/blob/ddd11bcc07ddf61bf5edd835a4b621a3ef1d395a/cmd/daprd/main.go#L48

```
func main() {
	// set GOMAXPROCS
	_, _ = maxprocs.Set()

	rt, err := runtime.FromFlags(os.Args[1:])
	if err != nil {
```

[2] https://github.com/dapr/dapr/tree/ddd11bcc07ddf61bf5edd835a4b621a3ef1d395a/cmd/daprd

```
            log.Fatal(err)
        }
```

Which returns a `DaprRuntime`:
https://github.com/dapr/dapr/blob/d5f9625cf94e3b032759d7ef35a5256287c183cd/pkg/runtime/cli.go#L445

```
        return NewDaprRuntime(runtimeConfig, globalConfig, accessControlList,
resiliencyProvider), nil
}
```

`daprd` then starts the `DaprRuntime` with all the available building blocks:
https://github.com/dapr/dapr/blob/ddd11bcc07ddf61bf5edd835a4b621a3ef1d395a/cmd/daprd/main.go#L66

```
        err = rt.Run(
                runtime.WithSecretStores(secretstoresLoader.DefaultRegistry),
                runtime.WithStates(stateLoader.DefaultRegistry),
                runtime.WithConfigurations(configurationLoader.DefaultRegistry),
                runtime.WithLocks(lockLoader.DefaultRegistry),
                runtime.WithPubSubs(pubsubLoader.DefaultRegistry),
                runtime.WithNameResolutions(nrLoader.DefaultRegistry),
                runtime.WithBindings(bindingsLoader.DefaultRegistry),
                runtime.WithCryptoProviders(cryptoLoader.DefaultRegistry),
                runtime.WithHTTPMiddlewares(httpMiddlewareLoader.DefaultRegistry),
                runtime.WithWorkflowComponents(workflowsLoader.DefaultRegistry),
        )
```

`DaprRuntime` starts a gRPC server and an HTTP server which the user application communicates with.

The endpoints are implemented here:

- gRPC: https://github.com/dapr/dapr/blob/89a93c9516da56e03b74316ecfcf95ae4c23f488/pkg/grpc/api.go
- HTTP: https://github.com/dapr/dapr/blob/5aba3c9aa4ea9b3f388df125f9c66495b43c5c9e/pkg/http/api.go

Threat actors

A threat actor is an individual or group that intentionally attempts to exploit vulnerabilities, deploy malicious code, or compromise or disrupt a Dapr deployment, often for financial gain, espionage, or sabotage.

We identify the following threat actors below; For example, a fully untrusted user can also be a contributor to a 3rd-party library used by Dapr. actors for Dapr. A threat actor can assume multiple profiles from the tab

Actor	**Description**	**Level of trust**
External attacker	Users that have not been granted any privileges and are unauthenticated.	Fully untrusted
Cluster operator	A user that has permissions to manage the Kubernetes cluster for deployments of Dapr in Kubernetes mode.	Fully trusted
Application user	A user of the application that the Dapr sidecar has been deployed alongside.	Fully untrusted
Contributors to 3rd-party dependencies	Contributors to dependencies used by Dapr.	Fully untrusted
Well-funded criminal groups	Organized criminal groups that often have either political or economic goals. These groups typically have large resources available and specific goals to achieve.	Fully untrusted
Cloud service users	Users managing the cloud services that a Dapr deployment interacts with.	Partially untrusted

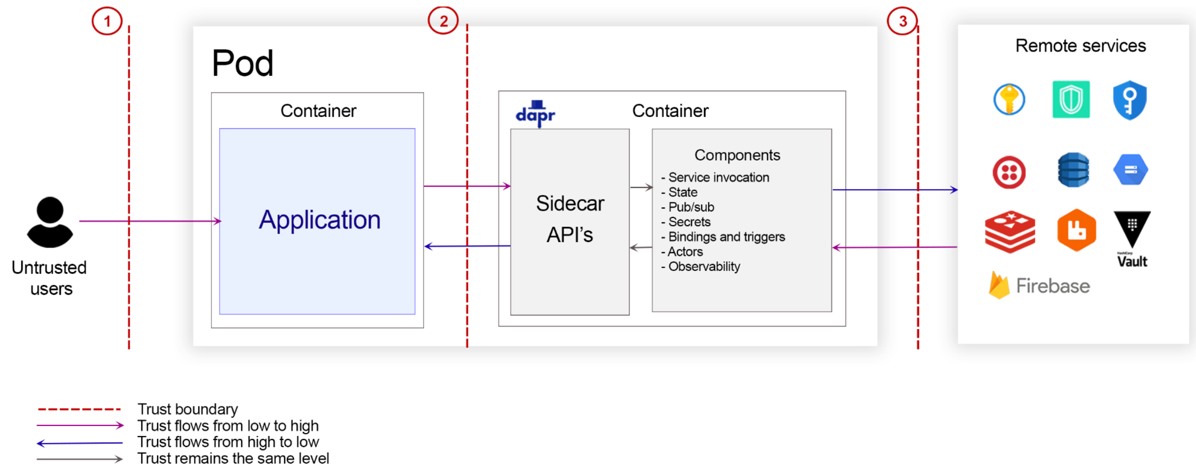
Trustflow

Trustflow describes how trust flows through a software system. We identity four trust zones in Daprs threat model:

#	**Name**	**Description**
1	Internet	Dapr users will often expose their application to the internet. For later reference, we call users in the Internet trust zone “Application Users” as they are meant to interact with the application.
2	User application	The application that users are deploying Dapr with.

3	Dapr Runtime	The Dapr runtime as specified in the code walkthrough in the previous section. This includes the Dapr components that the user has enabled with their deployment.
4	Remote Cloud Services	Google Cloud, Amazon AWS, Microsoft Azure and others.

Below we illustrate the trustflow across Daprs trust zone and draw the trust boundaries between each zone.



This diagram presents the trustflow between applications users, the application, the Dapr sidecar and the remote services. There are three trust boundaries in this workflow:

1: Trust boundary between untrusted users and the application
The first trust boundary sits between the internet and the application. Here, trust flows from low to high in the direction from the internet to the application. This trust boundary exemplifies use cases where the application accepts untrusted data from the internet.

2: Trust boundary between the application and the Dapr sidecar
When the user application interacts with the Dapr sidecar, trust flows from low to high to low in the direction from the application to the Dapr sidecar, and high to low in the opposite direction. Dapr should guarantee its security posture from malicious requests from the user application through supported Dapr endpoints: An application sending malicious requests to Dapr should not be able to compromise Daprs security posture; however, Dapr should not guarantee that the application's security remains uncompromised in the case of malicious requests from Dapr to the application - this is the responsibility of the application to ensure. For example, if Dapr sends a request to a NodeJS application that triggers a remote code execution vulnerability in the NodeJS

application[3], this is entirely the responsibility of the application; Dapr should not be prevented from sending such requests to the application. The same principle applies in the opposite direction: The application should be able to send any request to the Dapr sidecar without compromising Dapr; It is Daprs responsibility to take adequate measures to harden itself against any potentially harmful request.

The trust boundary between the application and the Dapr sidecar exists for that reason: Dapr cannot guarantee that the application takes adequate measures to sanitize, normalize and check all incoming requests before the user application passes these onto Dapr. As such, from the perspective of Dapr, requests from the application are untrusted and Dapr should ensure that the sidecar is not compromised from them. Importantly, Dapr should ensure its own security posture, but it does not need to harden against compromises later in the dataflow; For example, an untrusted user may send a request to the user application that compromises neither the user application nor the Dapr sidecar nor a particular Dapr component but does trigger a vulnerability in a remote service. The request could also trigger a vulnerability that returns sensitive information from the remote service all the way back through the Dapr sidecar, through the user application to the untrusted user. This is not Daprs responsibility to defend against.

3: Trust boundary between the Dapr sidecar and remote services
When Dapr components interact with remote cloud services, traffic crosses the cluster's trust boundary. When data leaves the cluster, trust flows from high to low in the direction from the cluster to the cloud service. This trust boundary has a few security implications for Dapr: First, cloud providers offering these remote services can be compromised, and an attacker can obtain control over the data being sent to Dapr. An attacker who controls the data sent to Dapr can most likely do severe damage to other customers of the remote service besides Dapr users. As such, the attacker could seek much more rewarding outcomes than sending malicious data to a Dapr deployment. However, some criminal groups could consider compromising a particular, targeted Dapr deployment the highest reward for their objectives; for example, groups that specifically target political dissidents would find it more rewarding to compromise a single high-profile political dissident than 100 regular internet users. Google has been the victim of persistent attacks from state-backed groups that attempted to breach Google's infrastructure to access private emails of human activists[4]. As such, we consider this an attack vector that well-funded threat actors are willing to attempt. Breaching the cloud providers' infrastructure is not the only route to control the data that Dapr users receive from these remote services; Threat actors can instead breach the accounts managing these remote services. A user may have user accounts registered with limited permissions that are sufficient to cause harm to Dapr

[3] For example CVE-2022-24760
[4] EP000: Operation Aurora | HACKING GOOGLE; https://www.youtube.com/watch?v=przDcQe6n5o

- for example write permissions to an S3 bucket. A threat actor could leverage this by writing a legitimate and valid object to the bucket that would cause Dapr to run slowly or exhaust its resources because of a vulnerability in the Dapr sidecar.

The main reason for this trust boundary is that Dapr cannot control what happens in the remote services and, therefore, cannot trust that they return data that never compromises the core security posture of Dapr. Above we highlighted how targeted attacks could compromise a Dapr deployment, but even unexpected changes in remote services can cause reliability issues in Dapr. A scenario could be that a remote storage service suddenly increases the allowed size of returned data blobs, and Dapr neither enforces time outs on long connections or processes the incoming blobs in such a manner that Dapr would exhaust its resources. In that case, a malicious threat actor could add large objects to a storage bucket and wait until Dapr would fetch it and cause denial of service of Dapr.

Components Contrib

The Components Contrib repository is a collection of community-maintained components that are either shipped with Dapr per default or can be plugged in.

This design is prone to a large attack surface from the 3rd-party dependency contributor threat actor. As such, the Components Contrib subproject should enforce measures to limit the attack surface. In essence, any contributor can make a contribution to a component and leave the project afterwards. If the contributor introduces bugs or security vulnerabilities, they are not required to follow up and fix these. This is not only relevant for Components Contrib's direct dependencies, but also for its transitive dependencies.

An attacker can commit malicious PRs to a library in Component-contribs dependency tree or perform a dependency confusion attack - which is a manoeuvre where an attacker takes over a library to harm a user of the library.

Another important part of the trust flow to and from Components Contrib is the question of sanitization of user input. If the application does not properly sanitize user input, the Dapr user exposes themselves to a wide range of vulnerabilities. An example from our manual code review are SQL Injections: All components that receive SQL queries from the application and pass them to the database service are vulnerable to SQL injections if the user does not properly sanitize these. In most cases, the full SQL query comes from the request which gives the attacker full control over the query[5].

[5] We have tracked this issue under "Issues found" with ID ADA-DAPR-23-3.

Because of this attack surface from untrusted input, it is important that Dapr clearly communicates the security boundaries of the Components Contrib sub-project. We found the documentation to not communicate that sufficiently, and we found that several components were ambiguous about the trust from the data coming from the user application. For example, we found two components that do not trust the incoming request. The first component is the localstorage binding which is hardened against arbitrary file writes:

https://github.com/dapr/components-contrib/blob/cfbac4d794b35e5da28d65a13369d33383fb6ad4/bindings/localstorage/localstorage.go#L162C1-L187C3

```go
func (ls *LocalStorage) create(filename string, req *bindings.InvokeRequest)
(*bindings.InvokeResponse, error) {
	d, err := strconv.Unquote(string(req.Data))
	if err == nil {
		req.Data = []byte(d)
	}

	decoded, err := base64.StdEncoding.DecodeString(string(req.Data))
	if err == nil {
		req.Data = decoded
	}

	absPath, relPath, err := getSecureAbsRelPath(ls.metadata.RootPath, filename)
	if err != nil {
		return nil, fmt.Errorf("error getting absolute path for file %s: %w",
filename, err)
	}

	dir := filepath.Dir(absPath)
	err = os.MkdirAll(dir, 0o777)
	if err != nil {
		return nil, fmt.Errorf("error creating directory %s: %w", dir, err)
	}

	f, err := os.Create(absPath)
	if err != nil {
		return nil, fmt.Errorf("error creating file %s: %w", absPath, err)
	}
```

`getSecureAbsRelPath()` defends against path traversal attacks:

https://github.com/dapr/components-contrib/blob/cfbac4d794b35e5da28d65a13369d33383fb6ad4/bindings/localstorage/localstorage.go#L284-L295

```go
func getSecureAbsRelPath(rootPath string, filename string) (absPath string, relPath
string, err error) {
	absPath, err = securejoin.SecureJoin(rootPath, filename)
	if err != nil {
		return
	}
	relPath, err = filepath.Rel(rootPath, absPath)
```

```
        if err != nil {
                return
        }

        return
}
```

The check for path traversal attacks is unnecessary if the input is trusted.

The second example we found was another defense against path traversal in the HTTP binding:

https://github.com/dapr/components-contrib/blob/e46130ad74ebd9871cfe0ad7914d3a168a914cc7/bindings/http/http.go#L229-L241

```
func (h *HTTPSource) Invoke(parentCtx context.Context, req *bindings.InvokeRequest)
(*bindings.InvokeResponse, error) {
        u := h.metadata.URL

        errorIfNot2XX := h.errorIfNot2XX // Default to the component config (default is
true)

        if req.Metadata != nil {
                if path, ok := req.Metadata["path"]; ok {
                        // Simplicity and no "../../.." type exploits.
                        u = fmt.Sprintf("%s/%s", strings.TrimRight(u, "/"),
strings.TrimLeft(path, "/"))
                        if strings.Contains(u, "..") {
                                return nil, fmt.Errorf("invalid path: %s", path)
                        }
                }
```

This check is also unnecessary in case the `InvokeRequest` is trusted.

Fuzzing

During the audit, Ada Logics wrote five new fuzzers for Dapr. We added the fuzzers to Daprs OSS-Fuzz integration so that they run continuously after the audit concluded. This allows the fuzzers to run for a longer time and explore more of the reachable code. It also allows the fuzzers to keep testing the latest master branch as it evolves to test whether new bugs get introduced. Short-term, OSS-Fuzz was of value, in that one of the fuzzers found a security vulnerability in a 3rd-party dependency to Components Contrib (ADA-DAPR-23-7).

We added all fuzzers to Daprs integration at https://github.com/cncf/cncf-fuzzing/tree/main/projects/dapr. When OSS-Fuzz builds Daprs fuzzers, it pulls them from there and compiles them against the latest main/master branch.

The fuzzers added during this audit are:

#	Name	Target code
1	`FuzzRLTest`	`github.com/dapr/components-contrib/middleware/http/ratelimit`
2	`FuzzAzureEventGridTest`	`github.com/dapr/components-contrib/bindings/azure/eventgrid`
3	`FuzzGraphqlRETest`	`github.com/dapr/components-contrib/bindings/graphql`
4	`FuzzAvroTest`	`github.com/dapr/components-contrib/pubsub/pulsar`
5	`FuzzPurellTest`	`github.com/dapr/dapr/pkg/acl`

FuzzRLTest
Tests whether well-crafted requests to the `ratelimit` middleware component can cause harm.

URL:
https://github.com/cncf/cncf-fuzzing/blob/7ed5200c931ff9277d0cd7f587d8792295cd597d/projects/dapr/fuzz_components_contrib_ratelimiter_test.go

FuzzAzureEventGridTest
Tests the validation routine for the authorization header of incoming requests.

URL:
https://github.com/cncf/cncf-fuzzing/blob/d9711dcf18a17cb8671b0b80023eabf2b557a9f5/projects/dapr/fuzz_components_contrib_azure_eventgrid_test.go

FuzzGraphqlRETest
Tests whether the regular expression that processes incoming requests to the GraphQL component is safe.

URL:
https://github.com/cncf/cncf-fuzzing/blob/d9711dcf18a17cb8671b0b80023eabf2b557a9f5/projects/dapr/fuzz_components_contrib_graphql_test.go

FuzzAvroTest
Tests the parsing routine for incoming requests to the Pulsar pubsub component.

URL:
https://github.com/cncf/cncf-fuzzing/blob/ec91e3af6a8de485e207bfabbc91442a39c23b01/projects/dapr/fuzz_components_contrib_pubsub_pulsar_test.go

FuzzPurellTest
Tests a string processing routine that Dapr's `acl` package uses to normalize the URLs of incoming requests.

URL:
https://github.com/cncf/cncf-fuzzing/blob/ec91e3af6a8de485e207bfabbc91442a39c23b01/projects/dapr/fuzz_acl_test.go#L43

Issues found

In this section we present the findings from goal #2 of the security audit, “Perform a manual code audit of the code assets in scope.” We found 7 security issues during this goal, one of which was a security vulnerability in a 3rd-party library which was assigned CVE-2023-37475[6]. Issue 1, 2, 3, and 4 are umbrella issues of a specific class of vulnerabilities that affect several components in the same building block in a similar manner.

#	ID	Title	Severity	Fixed
1	ADA-DAPR-23-1	Lack of warning when skipping certificate verification	Informational	Yes
2	ADA-DAPR-23-2	DoS from large responses from cloud services	Moderate	Yes
3	ADA-DAPR-23-3	SQL strings are not sanitized to defend against injections	Moderate	Yes
4	ADA-DAPR-23-4	Denial of service of Dapr from bypassing limit of response size	Low	No
5	ADA-DAPR-23-5	Archived and deprecated 3rd-party dependencies	Low	Yes
6	ADA-DAPR-23-6	Possible DoS in HTTP binding	Moderate	Yes
7	ADA-DAPR-23-7	OOM triggerable by malicious PubSub message	Moderate	Yes

[6] ADA-DAPR-23-7

Lack of warning when skipping certificate verification

ID	ADA-DAPR-23-1
Component	Components Contrib
Severity	Informational
Fixed in: https://github.com/dapr/components-contrib/pull/3090/files	

Some components allow the user to skip TLS verification which per default is disabled which is positive for Daprs security posture. Most modules also both name the option "insecure" and log a warning if the user has opted in for this setting which is best-practice for this type of setting. For example the kafka component labels the option insecure:
https://github.com/dapr/components-contrib/blob/d098e38d6a4c12c4c1a2e64ed724e4bd3e528a80/internal/component/kafka/sasl_oauthbearer.go#L77

```
	tlsConfig := &tls.Config{
		MinVersion:         tls.VersionTLS12,
		InsecureSkipVerify: ts.skipCaVerify,
	}
```

The Kafka component also logs a warning:
https://github.com/dapr/components-contrib/blob/cbe0da4b14356834c8f502534bbd89dbf48161ff/internal/component/kafka/metadata.go#L216

```
	if m.TLSSkipVerify {
		k.logger.Infof("kafka: you are using 'skipVerify' to skip server config
verify which is unsafe!")
	}
```

Not all components follow this practice. The Hashicorp Vault Secretstore component labels the option "Insecure" but does not log a warning. Other components do not log if certification verification is skipped.

We recommend following the standards for all components that allow users to skip certificate verification:

1. Always name the option "Insecure"
2. Always log a warning if the option is used.
3. Always disable certificate verification by default.

DoS from large responses from cloud services

ID	ADA-DAPR-23-2
Component	Components Contrib
Severity	Moderate
Fixed in: https://github.com/dapr/docs/pull/3684	

A common pattern of Daprs components is that it reads the response from cloud services entirely into memory without setting a limit to the size response from the cloud services. A large response has the potential to drain memory and cause denial of service of Dapr. This issue is an umbrella issue for all cases the Dapr components perform this operation.

This will not result in a system-wide resource exhaustion, but an attacker will be able to use enough memory for Go to perform a sigkill and crash Dapr causing a denial-of-service. This may result in a denial of service for other Go processes on the machine.

The issue can be triggered accidentally or purposefully; If a user simply misconfigures their Dapr deployment, they might at some point request a large object from a cloud service that exhausts memory of the Dapr sidecar. The attack vector of this umbrella issue is that a lower-privileged user can purposefully add a large object to a cloud store that will exhaust memory when Dapr requests it. The attacker is likely to be an insider who has certain privileges.

Example 1: Vault

If the Vault SecretStore component does not receive a successful response from the remote store, Dapr copies the response into a buffer and subsequently logs it:
https://github.com/dapr/components-contrib/blob/cfbac4d794b35e5da28d65a13369d33383fb6ad4/secretstores/hashicorp/vault/vault.go#L247

```
	if httpresp.StatusCode != http.StatusOK {
		var b bytes.Buffer
		io.Copy(&b, httpresp.Body)
		v.logger.Debugf("getSecret %s couldn't get successful response: %#v, %s",
secret, httpresp, b.String())
		if httpresp.StatusCode == http.StatusNotFound {
			// handle not found error
			return nil, fmt.Errorf("getSecret %s failed %w", secret,
ErrNotFound)
		}

		return nil, fmt.Errorf("couldn't get successful response, status code %d,
body %s",
			httpresp.StatusCode, b.String())
	}
```

If the remote Secretstore returns a large response, these two lines will exhaust memory and crash the Dapr instance resulting in a denial-of-service of Dapr.

Example 2: Vault

If Dapr receives a http.StatusOK from the remote Secretstore and the vaultValueType is not a map type, then Dapr will read the entire response into memory without an upper bounds to the size of the body of the response:
https://github.com/dapr/components-contrib/blob/cfbac4d794b35e5da28d65a13369d33383fb6ad4/secretstores/hashicorp/vault/vault.go#L267

```
	if v.vaultValueType.isMapType() {
		// parse the secret value to map[string]string
		if err := json.NewDecoder(httpresp.Body).Decode(&d); err != nil {
			return nil, fmt.Errorf("couldn't decode response body: %s", err)
		}
	} else {
		// treat the secret as string
		b, err := io.ReadAll(httpresp.Body)
		if err != nil {
			return nil, fmt.Errorf("couldn't read response: %s", err)
		}
		res := v.json.Get(b, DataStr, DataStr).ToString()
		d.Data.Data = map[string]string{
			secret: res,
		}
	}
```

Example 3: Wasm

While not a cloud service, Daprs Wasm component's request handler can cause excessive resource exhaustion on the host machine which can lead to DoS of Dapr. If a request causes the Wasm handler to generate a large `stdout` or `stderr` buffer, Dapr will it entirely into memory and exhaust memory of the machine:

https://github.com/dapr/components-contrib/blob/651834e9de50616be9374a933a90be69e5fcc2cc/middleware/http/wasm/httpwasm.go#L98-L115

```
func (rh *requestHandler) requestHandler(next http.Handler) http.Handler {
	return http.HandlerFunc(func(w http.ResponseWriter, r *http.Request) {
		h := rh.mw.NewHandler(r.Context(), next)
		defer func() {
			rh.stdout.Reset()
			rh.stderr.Reset()
		}()

		h.ServeHTTP(w, r)

		if stdout := rh.stdout.String(); len(stdout) > 0 {
			rh.logger.Debugf("wasm stdout: %s", stdout)
		}
		if stderr := rh.stderr.String(); len(stderr) > 0 {
			rh.logger.Debugf("wasm stderr: %s", stderr)
		}
	})
}
```

Recommendation

Check the size of the `stdout` and `stderr` buffers before reading them.

Example 4: Oracle Cloud Infrastructure

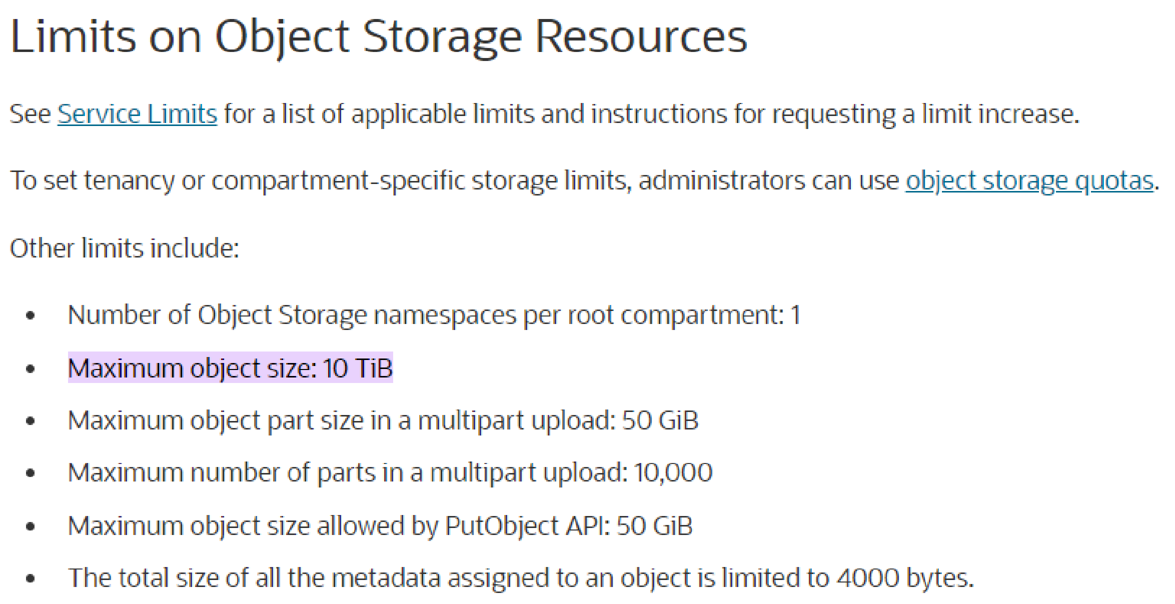
Daprs OCI (Oracle Cloud Infrastructure) client fetches an object from the OCI storage in its `getObject()` method:

```
func (c *ociObjectStorageClient) getObject(ctx context.Context, objectname string)
(content []byte, etag *string, metadata map[string]string, err error) {
	c.logger.Debugf("read file %s from OCI ObjectStorage StateStore %s ",
objectname, &c.objectStorageMetadata.BucketName)
	request := objectstorage.GetObjectRequest{
		NamespaceName: &c.objectStorageMetadata.Namespace,
		BucketName:    &c.objectStorageMetadata.BucketName,
		ObjectName:    &objectname,
	}
	response, err := c.objectStorageMetadata.OCIObjectStorageClient.GetObject(ctx,
request)
	if err != nil {
		c.logger.Debugf("Issue in OCI ObjectStorage with retrieving object %s,
error:  %s", objectname, err)
		if response.RawResponse.StatusCode == http.StatusNotFound {
			return nil, nil, nil, nil
		}
		return nil, nil, nil, fmt.Errorf("failed to retrieve object : %w", err)
	}
	buf := new(bytes.Buffer)
	buf.ReadFrom(response.Content)
	return buf.Bytes(), response.ETag, response.OpcMeta, nil
}
```

This method reads the contents of the retrieved object entirely into memory on its last line:

```
        buf := new(bytes.Buffer)
        buf.ReadFrom(response.Content)
        return buf.Bytes(), response.ETag, response.OpcMeta, nil
```

This could create a resource exhaustion scenario given that the limit of an objects size is 10TiB in Oracle Cloud Infrastructure:



Limits on Object Storage Resources

See Service Limits for a list of applicable limits and instructions for requesting a limit increase.

To set tenancy or compartment-specific storage limits, administrators can use object storage quotas.

Other limits include:

- Number of Object Storage namespaces per root compartment: 1
- Maximum object size: 10 TiB
- Maximum object part size in a multipart upload: 50 GiB
- Maximum number of parts in a multipart upload: 10,000
- Maximum object size allowed by PutObject API: 50 GiB
- The total size of all the metadata assigned to an object is limited to 4000 bytes.

https://docs.oracle.com/en-us/iaas/Content/Object/Concepts/objectstorageoverview.htm#:~:text=Maximum%20object%20size%3A%2010%20TiB

We found the same issue in the following components:

- Alibaba Cloud DingTalk binding (Alpha component*)
- Apple Push Notification Service binding
- Azure Blob Storage state store
- Azure Signalr binding (Alpha component*)
- GCP bucket binding (Alpha component*)
- Hashicorp Vault binding
- Huawei OBS binding (Alpha component*)
- OCI binding (Beta component*)
- Twilio SMS binding (Alpha component*)

* Not recommended to be used in production.

SQL strings are not sanitized to defend against injections

ID	ADA-DAPR-23-3
Component	Components Contrib
Severity	Moderate

Fixed in:
- https://github.com/dapr/components-contrib/pull/2975
- https://github.com/dapr/components-contrib/pull/2972

Daprs bindings dealing with SQL in Components Contrib do not sanitize the queries before executing them which could lead to sql injection attacks in case the user passes untrusted input from the application to Dapr. In fact, if an attacker can get a malicious SQL query to the MySQL binding, https://github.com/dapr/components-contrib/blob/cfbac4d794b35e5da28d65a13369d33383fb6ad4/bindings/mysql/mysql.go#L136, they have essentially succeeded in executing an SQL injection, since the SQL string is not sanitized:

https://github.com/dapr/components-contrib/blob/cfbac4d794b35e5da28d65a13369d33383fb6ad4/bindings/mysql/mysql.go#L136

```
func (m *Mysql) Invoke(ctx context.Context, req *bindings.InvokeRequest)
(*bindings.InvokeResponse, error) {
	if req == nil {
		return nil, errors.New("invoke request required")
	}

	if req.Operation == closeOperation {
		return nil, m.db.Close()
	}

	if req.Metadata == nil {
		return nil, errors.New("metadata required")
	}
	m.logger.Debugf("operation: %v", req.Operation)

	s, ok := req.Metadata[commandSQLKey]
	if !ok || s == "" {
		return nil, fmt.Errorf("required metadata not set: %s",
commandSQLKey)
	}

	startTime := time.Now()
```

```
        resp := &bindings.InvokeResponse{
                Metadata: map[string]string{
                        respOpKey:          string(req.Operation),
                        respSQLKey:         s,
                        respStartTimeKey: startTime.Format(time.RFC3339Nano),
                },
        }

        switch req.Operation { //nolint:exhaustive
        case execOperation:
                r, err := m.exec(ctx, s)
                if err != nil {
                        return nil, err
                }
                resp.Metadata[respRowsAffectedKey] = strconv.FormatInt(r, 10)

        case queryOperation:
                d, err := m.query(ctx, s)
                if err != nil {
                        return nil, err
                }
                resp.Data = d

        default:
                return nil, fmt.Errorf("invalid operation type: %s. Expected %s,
%s, or %s",
                        req.Operation, execOperation, queryOperation,
closeOperation)
        }

        endTime := time.Now()
        resp.Metadata[respEndTimeKey] = endTime.Format(time.RFC3339Nano)
        resp.Metadata[respDurationKey] = endTime.Sub(startTime).String()

        return resp, nil
}
```

Recommendation

We recommend one of the following:

- Properly sanitize SQL strings before passing them onto the service.
- Document that users should never pass unsanitized, untrusted SQL to bindings.

Denial of service of Dapr from bypassing limit of response size in AppChannel

ID	ADA-DAPR-23-4
Component	Local and external HTTP channels
Severity	Low
Fixed: No	

Dapr has two cases of possible bypasses of a size checks of HTTP responses from untrusted sources:

1. Daprs external AppChannel
2. Daprs local AppChannel

The vulnerable methods limit the size of a response from a user application, however, an attacker can trigger an OOM panic before Dapr performs the size check.

External AppChannel

The issue is triggerable from Dapr Runtimes `(h *HTTPEndpointAppChannel)InvokeMethod`. Below we demonstrate how the data flows from `(h *HTTPEndpointAppChannel).InvokeMethod` to the point of failure:
https://github.com/dapr/dapr/blob/20d56527e94d451e014be27a0b778e87b0b9556a/pkg/channel/external/http_channel.go#L90

```
func (h *HTTPEndpointAppChannel) InvokeMethod(ctx context.Context, req
*invokev1.InvokeMethodRequest, appID string) (rsp *invokev1.InvokeMethodResponse, err
error)
```

invokes
https://github.com/dapr/dapr/blob/20d56527e94d451e014be27a0b778e87b0b9556a/pkg/channel/external/http_channel.go#L104

```
func (h *HTTPEndpointAppChannel) invokeMethodV1(ctx context.Context, req
*invokev1.InvokeMethodRequest, appID string) (*invokev1.InvokeMethodResponse, error)
```

Which sends the request to the user application and parses the response. When `invokeMethodV1()` parses the response, it limits the size of the response. In the below

code example, the lines highlighted with blue send the request to the user application, and the line highlighted with green invokes the parsing API of the response:
https://github.com/dapr/dapr/blob/20d56527e94d451e014be27a0b778e87b0b9556a/pkg/channel/external/http_channel.go#L104

```
func (h *HTTPEndpointAppChannel) invokeMethodV1(ctx context.Context, req
*invokev1.InvokeMethodRequest, appID string) (*invokev1.InvokeMethodResponse, error) {
	channelReq, err := h.constructRequest(ctx, req, appID)
	if err != nil {
		return nil, err
	}

	if h.ch != nil {
		h.ch <- struct{}{}
	}
	defer func() {
		if h.ch != nil {
			<-h.ch
		}
	}()

	// Emit metric when request is sent
	diag.DefaultHTTPMonitoring.ClientRequestStarted(ctx, channelReq.Method,
req.Message().Method, int64(len(req.Message().Data.GetValue())))
	startRequest := time.Now()

	var resp *http.Response
	if len(h.pipeline.Handlers) > 0 {
		// Exec pipeline only if at least one handler is specified
		rw := &httpChannel.RWRecorder{
			W: &bytes.Buffer{},
		}
		execPipeline := h.pipeline.Apply(http.HandlerFunc(func(wr
http.ResponseWriter, r *http.Request) {
			// Send request to user application
			// (Body is closed below, but linter isn't detecting that)
			//nolint:bodyclose
			clientResp, clientErr := h.client.Do(r)
			if clientResp != nil {
				copyHeader(wr.Header(), clientResp.Header)
				wr.WriteHeader(clientResp.StatusCode)
				_, _ = io.Copy(wr, clientResp.Body)
			}
			if clientErr != nil {
				err = clientErr
			}
		}))
		execPipeline.ServeHTTP(rw, channelReq)
		resp = rw.Result() //nolint:bodyclose
	} else {
		// Send request to user application
		// (Body is closed below, but linter isn't detecting that)
		//nolint:bodyclose
		resp, err = h.client.Do(channelReq)
	}
	elapsedMs := float64(time.Since(startRequest) / time.Millisecond)

	var contentLength int64
	if resp != nil {
		if resp.Header != nil {
			contentLength, _ =
strconv.ParseInt(resp.Header.Get("content-length"), 10, 64)
		}
	}

	if err != nil {
		diag.DefaultHTTPMonitoring.ClientRequestCompleted(ctx, channelReq.Method,
req.Message().GetMethod(), strconv.Itoa(http.StatusInternalServerError), contentLength,
elapsedMs)
		return nil, err
	}

	rsp, err := h.parseChannelResponse(req, resp)
	if err != nil {
		diag.DefaultHTTPMonitoring.ClientRequestCompleted(ctx, channelReq.Method,
req.Message().GetMethod(), strconv.Itoa(http.StatusInternalServerError), contentLength,
elapsedMs)
		return nil, err
	}

	diag.DefaultHTTPMonitoring.ClientRequestCompleted(ctx, channelReq.Method,
req.Message().GetMethod(), strconv.Itoa(int(rsp.Status().Code)), contentLength,
elapsedMs)

	return rsp, nil
}
```

`(h *HTTPEndpointAppChannel).parseChannelResponse` checks the size of the http response before converting it to an invoke method response:

https://github.com/dapr/dapr/blob/20d56527e94d451e014be27a0b778e87b0b9556a/pkg/channel/external/http_channel.go#LL245C1-L264C2

```
func (h *HTTPEndpointAppChannel) parseChannelResponse(req *invokev1.InvokeMethodRequest,
channelResp *http.Response) (*invokev1.InvokeMethodResponse, error) {
	contentType := channelResp.Header.Get("content-type")

	// Limit response body if needed
	var body io.ReadCloser
	if h.maxResponseBodySizeMB > 0 {
		body = streamutils.LimitReadCloser(channelResp.Body,
int64(h.maxResponseBodySizeMB)<<20)
	} else {
		body = channelResp.Body
	}

	// Convert status code
	rsp := invokev1.
		NewInvokeMethodResponse(int32(channelResp.StatusCode), "", nil).
```

```
                WithHTTPHeaders(channelResp.Header).
                WithRawData(body).
                WithContentType(contentType)

        return rsp, nil
}
```

The vulnerability

When Dapr copies the response from the response into the response writer in `execPipeline()`, a large body will crash Dapr with an out-of-memory panic. The issue are on the highlighted line:

https://github.com/dapr/dapr/blob/20d56527e94d451e014be27a0b778e87b0b9556a/pkg/channel/external/http_channel.go#L133-L138

```
                        clientResp, clientErr := h.client.Do(r)
                        if clientResp != nil {
                                copyHeader(wr.Header(), clientResp.Header)
                                wr.WriteHeader(clientResp.StatusCode)
                                _, _ = io.Copy(wr, clientResp.Body)
                        }
```

PoC

The following PoC demonstrates the issue. To reproduce, run the following PoC with go run main.go. We include the expected stacktrace below.

```
package main

import (
        "bytes"
        "fmt"
        "io"
        "net/http"
        "strings"
)

type client struct{}

func (c *client) Do(req *http.Request) *http.Response {
        longString := strings.Repeat("Abc", 10000000000)
        r1 := strings.NewReader(longString)
        r2 := strings.NewReader(longString)
        r3 := strings.NewReader(longString)
        body := io.NopCloser(io.MultiReader(r1, r2, r3))
        resp := &http.Response{Body: body}
        return resp
}

func main() {
        c := &client{}
        req, err := http.NewRequest(http.MethodGet, "http://userApp.com/api",
bytes.NewReader([]byte("request body")))
        if err != nil {
                panic(err)
        }
        resp := c.Do(req)
        fmt.Println("Copying...")
        if _, err := io.Copy(io.Discard, resp.Body); err != nil {
        }
}
```

PoC - expected stacktrace

```
fatal error: runtime: out of memory

runtime stack:
runtime.throw({0x55962e?, 0x0?})
        /usr/local/go/src/runtime/panic.go:1047 +0x5d fp=0x7fffb29cd648
sp=0x7fffb29cd618 pc=0x434a7d
runtime.sysMapOS(0xc000400000, 0x6fc400000?)
        /usr/local/go/src/runtime/mem_linux.go:187 +0x11b fp=0x7fffb29cd690
sp=0x7fffb29cd648 pc=0x417f7b
runtime.sysMap(0x69dde0?, 0xc3ffffffff?, 0x6adf78?)
        /usr/local/go/src/runtime/mem.go:142 +0x35 fp=0x7fffb29cd6c0 sp=0x7fffb29cd690
pc=0x417955
runtime.(*mheap).grow(0x69dde0, 0x37e11e?)
        /usr/local/go/src/runtime/mheap.go:1522 +0x245 fp=0x7fffb29cd738
sp=0x7fffb29cd6c0 pc=0x427ea5
runtime.(*mheap).allocSpan(0x69dde0, 0x37e11e, 0x0, 0xe9?)
        /usr/local/go/src/runtime/mheap.go:1243 +0x1b7 fp=0x7fffb29cd7d0
sp=0x7fffb29cd738 pc=0x4275f7
runtime.(*mheap).alloc.func1()
        /usr/local/go/src/runtime/mheap.go:961 +0x65 fp=0x7fffb29cd818 sp=0x7fffb29cd7d0
pc=0x4270a5
runtime.systemstack()
        /usr/local/go/src/runtime/asm_amd64.s:496 +0x49 fp=0x7fffb29cd820
sp=0x7fffb29cd818 pc=0x462329

goroutine 1 [running]:
runtime.systemstack_switch()
        /usr/local/go/src/runtime/asm_amd64.s:463 fp=0xc00011bc68 sp=0xc00011bc60
pc=0x4622c0
runtime.(*mheap).alloc(0x7f133ff6ed28?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/mheap.go:955 +0x65 fp=0xc00011bcb0 sp=0xc00011bc68
pc=0x426fe5
runtime.(*mcache).allocLarge(0x3f?, 0x6fc23ac00, 0x1)
        /usr/local/go/src/runtime/mcache.go:234 +0x85 fp=0xc00011bcf8 sp=0xc00011bcb0
pc=0x4169e5
runtime.mallocgc(0x6fc23ac00, 0x52a240, 0x1)
        /usr/local/go/src/runtime/malloc.go:1053 +0x4f7 fp=0xc00011bd60 sp=0xc00011bcf8
pc=0x40e097
runtime.makeslice(0x7f133ff64108?, 0x30?, 0x686a20?)
        /usr/local/go/src/runtime/slice.go:103 +0x52 fp=0xc00011bd88 sp=0xc00011bd60
pc=0x44b972
strings.(*Builder).grow(...)
        /usr/local/go/src/strings/builder.go:68
strings.(*Builder).Grow(...)
        /usr/local/go/src/strings/builder.go:82
strings.Repeat({0x554ee4?, 0xc000007860?}, 0xc000146000?)
        /usr/local/go/src/strings/strings.go:569 +0x11a fp=0xc00011be30 sp=0xc00011bd88
pc=0x4aa63a
main.(*client).Do(0x59fa68?, 0xc00001a100?)
        /tmp/gopoc/main.go:14 +0x45 fp=0xc00011bef8 sp=0xc00011be30 pc=0x518b05
```

```
main.main()
        /tmp/gopoc/main.go:29 +0xdb fp=0xc00011bf80 sp=0xc00011bef8 pc=0x518e7b
runtime.main()
        /usr/local/go/src/runtime/proc.go:250 +0x207 fp=0xc00011bfe0 sp=0xc00011bf80
pc=0x437367
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00011bfe8 sp=0xc00011bfe0
pc=0x4644e1

goroutine 2 [force gc (idle)]:
runtime.gopark(0x0?, 0x0?, 0x0?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00004efb0 sp=0xc00004ef90
pc=0x437796
runtime.goparkunlock(...)
        /usr/local/go/src/runtime/proc.go:387
runtime.forcegchelper()
        /usr/local/go/src/runtime/proc.go:305 +0xb0 fp=0xc00004efe0 sp=0xc00004efb0
pc=0x4375d0
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00004efe8 sp=0xc00004efe0
pc=0x4644e1
created by runtime.init.6
        /usr/local/go/src/runtime/proc.go:293 +0x25

goroutine 3 [GC sweep wait]:
runtime.gopark(0x0?, 0x0?, 0x0?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00004f780 sp=0xc00004f760
pc=0x437796
runtime.goparkunlock(...)
        /usr/local/go/src/runtime/proc.go:387
runtime.bgsweep(0x0?)
        /usr/local/go/src/runtime/mgcsweep.go:278 +0x8e fp=0xc00004f7c8 sp=0xc00004f780
pc=0x423ece
runtime.gcenable.func1()
        /usr/local/go/src/runtime/mgc.go:178 +0x26 fp=0xc00004f7e0 sp=0xc00004f7c8
pc=0x4193a6
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00004f7e8 sp=0xc00004f7e0
pc=0x4644e1
created by runtime.gcenable
        /usr/local/go/src/runtime/mgc.go:178 +0x6b

goroutine 4 [GC scavenge wait]:
runtime.gopark(0xc00001c070?, 0x59d4a0?, 0x1?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00004ff70 sp=0xc00004ff50
pc=0x437796
runtime.goparkunlock(...)
        /usr/local/go/src/runtime/proc.go:387
runtime.(*scavengerState).park(0x6865e0)
        /usr/local/go/src/runtime/mgcscavenge.go:400 +0x53 fp=0xc00004ffa0
sp=0xc00004ff70 pc=0x421e13
runtime.bgscavenge(0x0?)
        /usr/local/go/src/runtime/mgcscavenge.go:628 +0x45 fp=0xc00004ffc8
sp=0xc00004ffa0 pc=0x4223e5
runtime.gcenable.func2()
        /usr/local/go/src/runtime/mgc.go:179 +0x26 fp=0xc00004ffe0 sp=0xc00004ffc8
pc=0x419346
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00004ffe8 sp=0xc00004ffe0
pc=0x4644e1
created by runtime.gcenable
        /usr/local/go/src/runtime/mgc.go:179 +0xaa

goroutine 5 [finalizer wait]:
runtime.gopark(0x1a0?, 0x686a20?, 0x60?, 0x78?, 0xc00004e770?)
```

```
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00004e628 sp=0xc00004e608
pc=0x437796
runtime.runfinq()
        /usr/local/go/src/runtime/mfinal.go:193 +0x107 fp=0xc00004e7e0 sp=0xc00004e628
pc=0x4183e7
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00004e7e8 sp=0xc00004e7e0
pc=0x4644e1
created by runtime.createfing
        /usr/local/go/src/runtime/mfinal.go:163 +0x45
exit status 2
```

Local AppChannel

Daprs local AppChannel has a response size check that can be bypassed. The vulnerable method limits the size of a response from a user application, however, an attacker can trigger an OOM panic before Dapr performs the size check.

Dataflow

https://github.com/dapr/dapr/blob/7a0fdf9f016b0c3a3f48447bc4169838e6026ec2/pkg/channel/http/http_channel.go#L136

```
func (h *Channel) InvokeMethod(ctx context.Context, req *invokev1.InvokeMethodRequest)
(rsp *invokev1.InvokeMethodResponse, err error)
```

invokes

https://github.com/dapr/dapr/blob/7a0fdf9f016b0c3a3f48447bc4169838e6026ec2/pkg/channel/http/http_channel.go#L205

```
func (h *Channel) invokeMethodV1(ctx context.Context, req *invokev1.InvokeMethodRequest)
(*invokev1.InvokeMethodResponse, error)
```

Which sends the request to the user application and parses the response. When `invokeMethodV1()` parses the response, it limits the size of the response. Below the lines highlighted with blue send the request to the user application, and the line highlighted with green invokes the parsing API of the response:
https://github.com/dapr/dapr/blob/7a0fdf9f016b0c3a3f48447bc4169838e6026ec2/pkg/channel/http/http_channel.go#L205

```
func (h *Channel) invokeMethodV1(ctx context.Context, req *invokev1.InvokeMethodRequest)
(*invokev1.InvokeMethodResponse, error) {
       channelReq, err := h.constructRequest(ctx, req)
       if err != nil {
              return nil, err
       }

       if h.ch != nil {
```

```
			h.ch <- struct{}{}
		}
		defer func() {
			if h.ch != nil {
				<-h.ch
			}
		}()

		// Emit metric when request is sent
		diag.DefaultHTTPMonitoring.ClientRequestStarted(ctx, channelReq.Method,
req.Message().Method, int64(len(req.Message().Data.GetValue())))
		startRequest := time.Now()

		var resp *http.Response
		if len(h.pipeline.Handlers) > 0 {
			// Exec pipeline only if at least one handler is specified
			rw := &RWRecorder{
				W: &bytes.Buffer{},
			}
			execPipeline := h.pipeline.Apply(http.HandlerFunc(func(wr
http.ResponseWriter, r *http.Request) {
				// Send request to user application
				// (Body is closed below, but linter isn't detecting that)
				//nolint:bodyclose
				clientResp, clientErr := h.client.Do(r)
				if clientResp != nil {
					copyHeader(wr.Header(), clientResp.Header)
					wr.WriteHeader(clientResp.StatusCode)
					_, _ = io.Copy(wr, clientResp.Body)
				}
				if clientErr != nil {
					err = clientErr
				}
			}))
			execPipeline.ServeHTTP(rw, channelReq)
			resp = rw.Result() //nolint:bodyclose
		} else {
			// Send request to user application
			// (Body is closed below, but linter isn't detecting that)
			//nolint:bodyclose
			resp, err = h.client.Do(channelReq)
		}

		elapsedMs := float64(time.Since(startRequest) / time.Millisecond)

		var contentLength int64
		if resp != nil {
			if resp.Header != nil {
				contentLength, _ =
strconv.ParseInt(resp.Header.Get("content-length"), 10, 64)
			}
		}

		if err != nil {
			diag.DefaultHTTPMonitoring.ClientRequestCompleted(ctx, channelReq.Method,
req.Message().GetMethod(), strconv.Itoa(http.StatusInternalServerError), contentLength,
elapsedMs)
                return nil, err
        }

        rsp, err := h.parseChannelResponse(req, resp)
        if err != nil {
                diag.DefaultHTTPMonitoring.ClientRequestCompleted(ctx, channelReq.Method,
req.Message().GetMethod(), strconv.Itoa(http.StatusInternalServerError), contentLength,
elapsedMs)
                return nil, err
        }

        diag.DefaultHTTPMonitoring.ClientRequestCompleted(ctx, channelReq.Method,
req.Message().GetMethod(), strconv.Itoa(int(rsp.Status().Code)), contentLength,
elapsedMs)

        return rsp, nil
}
```

`parseChannelResponse()` checks the size of the http response before converting it to an invoke method response:

https://github.com/dapr/dapr/blob/7a0fdf9f016b0c3a3f48447bc4169838e6026ec2/pkg/channel/http/http_channel.go#L327

```
func (h *Channel) parseChannelResponse(req *invokev1.InvokeMethodRequest, channelResp
*http.Response) (*invokev1.InvokeMethodResponse, error) {
        contentType := channelResp.Header.Get("content-type")

        // Limit response body if needed
        var body io.ReadCloser
        if h.maxResponseBodySizeMB > 0 {
                body = streamutils.LimitReadCloser(channelResp.Body,
int64(h.maxResponseBodySizeMB)<<20)
        } else {
                body = channelResp.Body
        }

        // Convert status code
        rsp := invokev1.
                NewInvokeMethodResponse(int32(channelResp.StatusCode), "", nil).
                WithHTTPHeaders(channelResp.Header).
                WithRawData(body).
                WithContentType(contentType)

        return rsp, nil
}
```

The vulnerability

When Dapr copies the response from the response into the response writer in `execPipeline()`, a large body will crash Dapr with an out-of-memory panic. The issue are on the highlighted line:

https://github.com/dapr/dapr/blob/7a0fdf9f016b0c3a3f48447bc4169838e6026ec2/pkg/channel/http/http_channel.go#L234-L239

```
			clientResp, clientErr := h.client.Do(r)
			if clientResp != nil {
				copyHeader(wr.Header(), clientResp.Header)
				wr.WriteHeader(clientResp.StatusCode)
				_, _ = io.Copy(wr, clientResp.Body)
			}
```

Archived and deprecated 3rd-party dependencies

ID	ADA-DAPR-23-5
Component	Components Contrib
Severity	Low
Fixed: Yes	

Dapr core and Components Contrib has 5 archived or deprecated libraries in its direct dependency tree. They are:

#	Issue	Dependency	Mitigation
1	Archived	github.com/gorilla/mux	Has been un-archived after completion of audit. No change in code.
2	Archived	github.com/benbjohnson/clock	Removed in https://github.com/dapr/kit/pull/55
3	Archived	github.com/minio/blake2b-simd	Removed in https://github.com/dapr/dapr/pull/6763
4	Deprecated	github.com/nats-io/stan.go	Planned for removal in Dapr 1.13
5	Deprecated	github.com/golang/protobuf	Assessed by Dapr team. No change in code.

Archived or deprecated projects are unlikely to fix issues - both reliability issues and security vulnerabilities and that they are unlikely to even accept and triage security disclosures. Furthermore, the project are unlikely to do its own ongoing security work; For example, Ada Logics attempted to involve the project in integrating continuous fuzzing by way of OSS-Fuzz in 2020: https://github.com/gorilla/mux/pull/575 via a pull request that has still not been merged[7].

[7] This PR was closed after the Dapr audit had concluded.

Possible DoS in HTTP binding

ID	ADA-DAPR-23-6
Component	Components Contrib
Severity	Moderate
Fixed in: https://github.com/dapr/components-contrib/pull/3040	

Dapr's HTTP binding (https://github.com/dapr/components-contrib/blob/e46130ad74ebd9871cfe0ad7914d3a168a914cc7/bindings/http/http.go) reads the body of the response from a non-Dapr service entirely into memory. This could be a problem if the non-Dapr service returns a large buffer; Dapr can exhaust memory which will crash the Dapr sidecar and cause a limited denial of service of the host machine.

The HTTP binding reads the response into memory on the following line:

https://github.com/dapr/components-contrib/blob/e46130ad74ebd9871cfe0ad7914d3a168a914cc7/bindings/http/http.go#L320-L331

```
	resp, err := h.client.Do(request)
	if err != nil {
		return nil, err
	}
	defer resp.Body.Close()

	// Read the response body. For empty responses (e.g. 204 No Content)
	// `b` will be an empty slice.
	b, err := io.ReadAll(resp.Body)
	if err != nil {
		return nil, err
	}
```

This is a case where a vulnerable remote service can crash the Dapr sidecar. Instead of allowing this, we recommend that Dapr hardens itself against vulnerable remote services.

OOM triggerable by malicious PubSub message

ID	ADA-DAPR-23-7
Component	Components Contrib
Severity	Moderate
Fixed in: https://github.com/dapr/components-contrib/pull/2994	

This issue had its root cause in a 3rd-party dependency which assigned the following CVE:

Title	**GHSA**	**CVE**	**CVSS score**
Attacker-controlled parameter can cause DoS of avro	GHSA-9x44-9pgq-cf45	CVE-2023-37475	7.5

The Pulsar PubSub component is susceptible to an unrecoverable OOM panic that can be controlled by the data in a `PublishRequest`. This allows a user who can send a pubsub message to the Pulsar component to crash the Dapr sidecar. The following PoC demonstrates the issue. Add the unit test to `components-contrib/pubsub/pulsar/pulsar_test.go` and run it with `go test -run=TestParsePublishMetadata2`.

```
func TestParsePublishMetadata2(t *testing.T) {
        m := &pubsub.PublishRequest{}
        m.Data = []byte{246, 255, 255, 255, 255, 10, 255, 32, 32, 32, 32, 32,
32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32,
32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32}
        _, _ = parsePublishMetadata(m, schemaMetadata{protocol: avroProtocol,
value: "bytes"})
}
```

The test outputs the following stacktrace:

```
fatal error: runtime: out of memory

runtime stack:
runtime.throw({0xc32c27?, 0x8000?})
        /usr/local/go/src/runtime/panic.go:1047 +0x5d fp=0x7ffe4bbc6ce8
sp=0x7ffe4bbc6cb8 pc=0x445a9d
runtime.sysMapOS(0xc000400000, 0x2c00000000?)
        /usr/local/go/src/runtime/mem_linux.go:187 +0x11b fp=0x7ffe4bbc6d30
sp=0x7ffe4bbc6ce8 pc=0x424dfb
```

```
runtime.sysMap(0x11aa240?, 0x7fffffffffff?, 0x11ba3d8?)
        /usr/local/go/src/runtime/mem.go:142 +0x35 fp=0x7ffe4bbc6d60 sp=0x7ffe4bbc6d30
pc=0x4247d5
runtime.(*mheap).grow(0x11aa240, 0x1600000?)
        /usr/local/go/src/runtime/mheap.go:1522 +0x252 fp=0x7ffe4bbc6dd8
sp=0x7ffe4bbc6d60 pc=0x436832
runtime.(*mheap).allocSpan(0x11aa240, 0x1600000, 0x0, 0xae?)
        /usr/local/go/src/runtime/mheap.go:1243 +0x1b7 fp=0x7ffe4bbc6e70
sp=0x7ffe4bbc6dd8 pc=0x435f77
runtime.(*mheap).alloc.func1()
        /usr/local/go/src/runtime/mheap.go:961 +0x65 fp=0x7ffe4bbc6eb8 sp=0x7ffe4bbc6e70
pc=0x435a25
runtime.systemstack()
        /usr/local/go/src/runtime/asm_amd64.s:496 +0x49 fp=0x7ffe4bbc6ec0
sp=0x7ffe4bbc6eb8 pc=0x47a469

goroutine 34 [running]:
runtime.systemstack_switch()
        /usr/local/go/src/runtime/asm_amd64.s:463 fp=0xc000392950 sp=0xc000392948
pc=0x47a400
runtime.(*mheap).alloc(0x41ec7da5e2f3832e?, 0x1e376c080001d74b?, 0x4c?)
        /usr/local/go/src/runtime/mheap.go:955 +0x65 fp=0xc000392998 sp=0xc000392950
pc=0x435965
runtime.(*mcache).allocLarge(0x7?, 0x2bfffffffb, 0x1)
        /usr/local/go/src/runtime/mcache.go:234 +0x85 fp=0xc0003929e0 sp=0xc000392998
pc=0x423865
runtime.mallocgc(0x2bfffffffb, 0xb44820, 0x1)
        /usr/local/go/src/runtime/malloc.go:1053 +0x4fe fp=0xc000392a48 sp=0xc0003929e0
pc=0x41a57e
runtime.makeslice(0xc0002e2320?, 0x7f210ffc40e8?, 0xc000392ab0?)
        /usr/local/go/src/runtime/slice.go:103 +0x52 fp=0xc000392a70 sp=0xc000392a48
pc=0x45de72
github.com/hamba/avro/v2.(*Reader).ReadBytes(0x41a68a?)
        /home/adam/go/pkg/mod/github.com/hamba/avro/v2@v2.5.0/reader.go:208 +0x74
fp=0xc000392ac0 sp=0xc000392a70 pc=0x835034
github.com/hamba/avro/v2.(*Reader).ReadNext(0xfaf5531d980c4e50?, {0xd24a90,
0xc0002b0060})
        /home/adam/go/pkg/mod/github.com/hamba/avro/v2@v2.5.0/reader_generic.go:63
+0x41f fp=0xc000392ca0 sp=0xc000392ac0 pc=0x83565f
github.com/hamba/avro/v2.(*efaceDecoder).Decode(0xc0001188f0?, 0xc0002807a0,
0xc0002b0060?)
        /home/adam/go/pkg/mod/github.com/hamba/avro/v2@v2.5.0/codec_dynamic.go:18 +0x1a5
fp=0xc000392d18 sp=0xc000392ca0 pc=0x8221c5
github.com/hamba/avro/v2.(*Reader).ReadVal(0xc0002e2320, {0xd24a90, 0xc0002b0060},
{0xb2da40, 0xc0002807a0})
        /home/adam/go/pkg/mod/github.com/hamba/avro/v2@v2.5.0/codec.go:53 +0x139
fp=0xc000392d98 sp=0xc000392d18 pc=0x8200f9
github.com/hamba/avro/v2.(*frozenConfig).Unmarshal(0xc000158080, {0xd24a90,
0xc0002b0060}, {0xc0002b81c0?, 0x535d2f?, 0x536253?}, {0xb2da40, 0xc0002807a0})
        /home/adam/go/pkg/mod/github.com/hamba/avro/v2@v2.5.0/config.go:143 +0x6e
fp=0xc000392de8 sp=0xc000392d98 pc=0x83394e
github.com/hamba/avro/v2.Unmarshal(...)
        /home/adam/go/pkg/mod/github.com/hamba/avro/v2@v2.5.0/decoder.go:49
github.com/dapr/components-contrib/pubsub/pulsar.parsePublishMetadata(0xc000392f18,
{{0xc275f8?, 0x59a?}, {0xc27c01?, 0x536220?}})
        /tmp/components-contrib/pubsub/pulsar/pulsar.go:300 +0x208 fp=0xc000392ef0
```

```
sp=0xc000392de8 pc=0xa3b868
github.com/dapr/components-contrib/pubsub/pulsar.TestParsePublishMetadata2(0x413239?)
        /tmp/components-contrib/pubsub/pulsar/pulsar_test.go:155 +0xb0 fp=0xc000392f70
sp=0xc000392ef0 pc=0xa3c850
testing.tRunner(0xc000288ea0, 0xc78960)
        /usr/local/go/src/testing/testing.go:1576 +0x10b fp=0xc000392fc0 sp=0xc000392f70
pc=0x53632b
testing.(*T).Run.func1()
        /usr/local/go/src/testing/testing.go:1629 +0x2a fp=0xc000392fe0 sp=0xc000392fc0
pc=0x53736a
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc000392fe8 sp=0xc000392fe0
pc=0x47c621
created by testing.(*T).Run
        /usr/local/go/src/testing/testing.go:1629 +0x3ea

goroutine 1 [chan receive]:
runtime.gopark(0x1192640?, 0xc000294048?, 0x20?, 0xa8?, 0xc00019da28?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00019d9a8 sp=0xc00019d988
pc=0x4487f6
runtime.chanrecv(0xc0002e83f0, 0xc00019daa7, 0x1)
        /usr/local/go/src/runtime/chan.go:583 +0x49d fp=0xc00019da38 sp=0xc00019d9a8
pc=0x4137fd
runtime.chanrecv1(0x11916c0?, 0xb445a0?)
        /usr/local/go/src/runtime/chan.go:442 +0x18 fp=0xc00019da60 sp=0xc00019da38
pc=0x4132f8
testing.(*T).Run(0xc000288d00, {0xc34996?, 0x535ba5?}, 0xc78960)
        /usr/local/go/src/testing/testing.go:1630 +0x405 fp=0xc00019db20 sp=0xc00019da60
pc=0x5371e5
testing.runTests.func1(0x1192640?)
        /usr/local/go/src/testing/testing.go:2036 +0x45 fp=0xc00019db70 sp=0xc00019db20
pc=0x5393a5
testing.tRunner(0xc000288d00, 0xc00019dc88)
        /usr/local/go/src/testing/testing.go:1576 +0x10b fp=0xc00019dbc0 sp=0xc00019db70
pc=0x53632b
testing.runTests(0xc0002bcbe0?, {0x11477c0, 0xa, 0xa}, {0x0?, 0x100c0002989a8?,
0x1191d00?})
        /usr/local/go/src/testing/testing.go:2034 +0x489 fp=0xc00019dcb8 sp=0xc00019dbc0
pc=0x539289
testing.(*M).Run(0xc0002bcbe0)
        /usr/local/go/src/testing/testing.go:1906 +0x63a fp=0xc00019df00 sp=0xc00019dcb8
pc=0x537bfa
main.main()
        _testmain.go:65 +0x1aa fp=0xc00019df80 sp=0xc00019df00 pc=0xa3f08a
runtime.main()
        /usr/local/go/src/runtime/proc.go:250 +0x207 fp=0xc00019dfe0 sp=0xc00019df80
pc=0x4483c7
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00019dfe8 sp=0xc00019dfe0
pc=0x47c621

goroutine 2 [force gc (idle)]:
runtime.gopark(0x0?, 0x0?, 0x0?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00006cfb0 sp=0xc00006cf90
pc=0x4487f6
runtime.goparkunlock(...)
```

```
        /usr/local/go/src/runtime/proc.go:387
runtime.forcegchelper()
        /usr/local/go/src/runtime/proc.go:305 +0xb0 fp=0xc00006cfe0 sp=0xc00006cfb0
pc=0x448630
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00006cfe8 sp=0xc00006cfe0
pc=0x47c621
created by runtime.init.6
        /usr/local/go/src/runtime/proc.go:293 +0x25

goroutine 3 [GC sweep wait]:
runtime.gopark(0x0?, 0x0?, 0x0?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00006d780 sp=0xc00006d760
pc=0x4487f6
runtime.goparkunlock(...)
        /usr/local/go/src/runtime/proc.go:387
runtime.bgsweep(0x0?)
        /usr/local/go/src/runtime/mgcsweep.go:278 +0x8e fp=0xc00006d7c8 sp=0xc00006d780
pc=0x43282e
runtime.gcenable.func1()
        /usr/local/go/src/runtime/mgc.go:178 +0x26 fp=0xc00006d7e0 sp=0xc00006d7c8
pc=0x427ae6
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00006d7e8 sp=0xc00006d7e0
pc=0x47c621
created by runtime.gcenable
        /usr/local/go/src/runtime/mgc.go:178 +0x6b

goroutine 4 [GC scavenge wait]:
runtime.gopark(0xc00003c070?, 0xd19350?, 0x1?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00006df70 sp=0xc00006df50
pc=0x4487f6
runtime.goparkunlock(...)
        /usr/local/go/src/runtime/proc.go:387
runtime.(*scavengerState).park(0x1191e20)
        /usr/local/go/src/runtime/mgcscavenge.go:400 +0x53 fp=0xc00006dfa0
sp=0xc00006df70 pc=0x430753
runtime.bgscavenge(0x0?)
        /usr/local/go/src/runtime/mgcscavenge.go:628 +0x45 fp=0xc00006dfc8
sp=0xc00006dfa0 pc=0x430d25
runtime.gcenable.func2()
        /usr/local/go/src/runtime/mgc.go:179 +0x26 fp=0xc00006dfe0 sp=0xc00006dfc8
pc=0x427a86
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00006dfe8 sp=0xc00006dfe0
pc=0x47c621
created by runtime.gcenable
        /usr/local/go/src/runtime/mgc.go:179 +0xaa

goroutine 18 [finalizer wait]:
runtime.gopark(0x1a0?, 0x1192640?, 0xe0?, 0x24?, 0xc00006c770?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc00006c628 sp=0xc00006c608
pc=0x4487f6
runtime.runfinq()
        /usr/local/go/src/runtime/mfinal.go:193 +0x107 fp=0xc00006c7e0 sp=0xc00006c628
pc=0x426b27
```

```
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc00006c7e8 sp=0xc00006c7e0
pc=0x47c621
created by runtime.createfing
        /usr/local/go/src/runtime/mfinal.go:163 +0x45

goroutine 19 [IO wait]:
runtime.gopark(0x0?, 0x0?, 0x0?, 0x0?, 0x0?)
        /usr/local/go/src/runtime/proc.go:381 +0xd6 fp=0xc000181a78 sp=0xc000181a58
pc=0x4487f6
runtime.netpollblock(0x0?, 0x4100cf?, 0x0?)
        /usr/local/go/src/runtime/netpoll.go:527 +0xf7 fp=0xc000181ab0 sp=0xc000181a78
pc=0x440e17
internal/poll.runtime_pollWait(0x7f211585a218, 0x72)
        /usr/local/go/src/runtime/netpoll.go:306 +0x89 fp=0xc000181ad0 sp=0xc000181ab0
pc=0x476b29
internal/poll.(*pollDesc).wait(0xc000158980?, 0xc000208470?, 0x0)
        /usr/local/go/src/internal/poll/fd_poll_runtime.go:84 +0x32 fp=0xc000181af8
sp=0xc000181ad0 pc=0x4b4832
internal/poll.(*pollDesc).waitRead(...)
        /usr/local/go/src/internal/poll/fd_poll_runtime.go:89
internal/poll.(*FD).ReadMsg(0xc000158980, {0xc000208470, 0x10, 0x10}, {0xc0000a2020,
0x1000, 0x1000}, 0x4359c0?)
        /usr/local/go/src/internal/poll/fd_unix.go:304 +0x3aa fp=0xc000181be8
sp=0xc000181af8 pc=0x4b6f2a
net.(*netFD).readMsg(0xc000158980, {0xc000208470?, 0x1?, 0xc000181ce0?}, {0xc0000a2020?,
0x1?, 0x5?}, 0x855d78?)
        /usr/local/go/src/net/fd_posix.go:78 +0x37 fp=0xc000181c70 sp=0xc000181be8
pc=0x68cb57
net.(*UnixConn).readMsg(0xc0001226a0, {0xc000208470?, 0xc000181d50?, 0x42fc05?},
{0xc0000a2020?, 0x419efe?, 0x7f2115855c38?})
        /usr/local/go/src/net/unixsock_posix.go:115 +0x4f fp=0xc000181d00
sp=0xc000181c70 pc=0x6a7f6f
net.(*UnixConn).ReadMsgUnix(0xc0001226a0, {0xc000208470?, 0x422a90?, 0x427eb1?},
{0xc0000a2020?, 0x41a68a?, 0xc00020e750?})
        /usr/local/go/src/net/unixsock.go:143 +0x3c fp=0xc000181d78 sp=0xc000181d00
pc=0x6a69bc
github.com/godbus/dbus.(*oobReader).Read(0xc0000a2000, {0xc000208470?, 0xc000181e28?,
0x41aa67?})

/home/adam/go/pkg/mod/github.com/godbus/dbus@v0.0.0-20190726142602-4481cbc300e2/transpor
t_unix.go:21 +0x45 fp=0xc000181df0 sp=0xc000181d78 pc=0x8c1405
io.ReadAtLeast({0xd1dd40, 0xc0000a2000}, {0xc000208470, 0x10, 0x10}, 0x10)
        /usr/local/go/src/io/io.go:332 +0x9a fp=0xc000181e38 sp=0xc000181df0 pc=0x4af45a
io.ReadFull(...)
        /usr/local/go/src/io/io.go:351
github.com/godbus/dbus.(*unixTransport).ReadMessage(0xc00012eab0)

/home/adam/go/pkg/mod/github.com/godbus/dbus@v0.0.0-20190726142602-4481cbc300e2/transpor
t_unix.go:91 +0x11e fp=0xc000181f68 sp=0xc000181e38 pc=0x8c1a1e
github.com/godbus/dbus.(*Conn).inWorker(0xc0001b2000)

/home/adam/go/pkg/mod/github.com/godbus/dbus@v0.0.0-20190726142602-4481cbc300e2/conn.go:
294 +0x3b fp=0xc000181fc8 sp=0xc000181f68 pc=0x8aaafb
github.com/godbus/dbus.(*Conn).Auth.func1()
```

```
/home/adam/go/pkg/mod/github.com/godbus/dbus@v0.0.0-20190726142602-4481cbc300e2/auth.go:
118 +0x26 fp=0xc000181fe0 sp=0xc000181fc8 pc=0x8a7de6
runtime.goexit()
        /usr/local/go/src/runtime/asm_amd64.s:1598 +0x1 fp=0xc000181fe8 sp=0xc000181fe0
pc=0x47c621
created by github.com/godbus/dbus.(*Conn).Auth

/home/adam/go/pkg/mod/github.com/godbus/dbus@v0.0.0-20190726142602-4481cbc300e2/auth.go:
118 +0x9ee
exit status 2
FAIL    github.com/dapr/components-contrib/pubsub/pulsar        0.026s
```

Root cause

The root cause of the issue is that the pulsar component's dependency, `github.com/hamba/avro/v2`, allocates memory of a size controllable by the payload:

https://github.com/hamba/avro/blob/v2.5.0/reader.go#L201C1-L211C2

```go
func (r *Reader) ReadBytes() []byte {
	size := r.ReadLong()
	if size < 0 {
		r.ReportError("ReadBytes", "invalid bytes length")
		return nil
	}

	buf := make([]byte, size)
	r.Read(buf)
	return buf
}
```

Exploitability

There is no evidence of malicious actors exploiting this in the wild, and the likelihood of Dapr users being affected by this is low; For users to be affected, they would need to use the Pulsar pubsub component and explicitly set a non-default Avro schema.

SLSA

SLSA is a framework for assessing the supply chain security posture of projects. The current version of SLSA is v1.0 which specifies a series of requirements related to the build platform for software releases as well as the provenance attestation. SLSA evaluates a project based on four security levels. Level 0 has no requirements as we do not include that in the table below.

The SLSA framework is intended to protect against a series of supply chain attack vectors that we have seen in the wild, for example attacks like build platform compromisation which was the case with the SolarWinds attack, where attackers compromised the build platform of a software vendor - SolarWinds - and injected malicious code that the vendor then distributed to its customers. The provenance statement helps users defend against typosquatting attacks or attacks as well as consuming packages from mirrors instead of the main and intended packages. These are known attack vectors; recently researchers found 1,652 malicious packages disguised as legitimate packages[8]. SLSA compliance is therefore an important factor of Daprs overall security posture and should be seen as an ongoing effort to achieve and maintain a solid integration with SLSAs specification. This will help Dapr defend against a series of well-known - by users and malicious actors - supply chain attack vectors.

Our overall assessment is that Dapr performs well against requirements for the build platform but is lacking the provenance statement. The provenance is a large and important part of the SLSA framework. Dapr is currently lacking a compliant provenance statement which brings compliance to a low level. Dapr performs well in other areas such as the build platform for release artifacts. We recommend adding the provenance generation via SLSA's official Github Actions workflows: https://github.com/slsa-framework/slsa-github-generator. The SLSA community is currently working on a framework, Bring Your Own Builder (BYOB), which includes level 3 compliance out of the box.

Our assessment for each criteria:

Requirement	L1	L2	L3
Provenance generation			
Provenance Exists	⛔	⛔	⛔
Provenance is Authentic		⛔	⛔

[8] https://sysdig.com/blog/analysis-of-supply-chain-attacks-through-public-docker-images/

Provenance is Unforgeable			⛔
Isolation			
Hosted		✓	✓
Isolated			✓

Supply-chain mitigations

During this audit we've found that the Dapr codebase is written to a high security standard and follows best security practices. This is reflected in the low number of issues we have found in the Dapr code assets that were in scope of this audit. We consider the supply-chain risk to be an area where Dapr faces a security risk, and in this section we recommend that Dapr adds Scorecard to their dependencies to mitigate this risk.

During the manual auditing and fuzzing goals of the audit, we found several issues that relate to Daprs supply-chain. We consider the threat from a malicious dependency to be the most substantial of these. Dapr has a wide attack surface from malicious dependencies with a large dependency tree:

Repository	**# of 3rd-party dependencies***	**# of 3rd-party nodes in callgraph***
github.com/dapr/components-contrib	~ 400	~ 250,000
github.com/dapr/dapr	~ 340	~ 105,000
github.com/dapr/kit	~ 20	~ 2600

**Includes direct and transitive dependencies used for production and test code. Does not include calls to the standard library but includes calls to standard library addon libraries (`golang.org/x/...`). This data has been generated by way of Class Hierarchy Analysis.*

A dependency can become malicious from a code change by either a contributor or a maintainer. A contributor can trick a maintainer into merging a pull request by obfuscating the malicious code, or they can assume the role of maintainer by obtaining control over the repository. Both maintainers and contributors can make malicious commits intentionally and unintentionally with both having been exercised in the wild. A case of an intentional malicious commit made by a maintainer is the node-ipc[9] library, to which the maintainer purposefully added a vulnerability that specifically targeted Russian users of the library[10]. Alternatively, a threat actor can become a maintainer and then add vulnerabilities to the software package. There are examples of real-world cases where a person - or group of people - sent an email to an open source project maintainer and asked if they could carry forward their archived project and succeeded in achieving maintainer status. To increase their chances, threat actors can build up trust by making a long line of legitimate code contributions before making a malicious one.

[9] https://github.com/RIAEvangelist/node-ipc
[10] https://www.theregister.com/2022/03/18/protestware_javascript_node_ipc/

This type of risk applies to all open source projects that use other open source packages in their dependency trees. The Scorecard project[11] aims to mitigate that risk by formalizing a set of security heuristics to evaluate the security practices of a software project. We recommend that Dapr long-term adds Scorecard to its dependencies to evaluate the ongoing improvements to the security of Daprs 3rd-party dependencies.

[11] https://github.com/ossf/scorecard